

Consulting Engineers

R&J Project: Am
Fly Ash 22' x 7' m #2
Boring:

Sheet 4 of 5

Sample: 1 Depth: Rig: 1

SCHEDULE CJG-ST1
B-6

Consulting Engineers

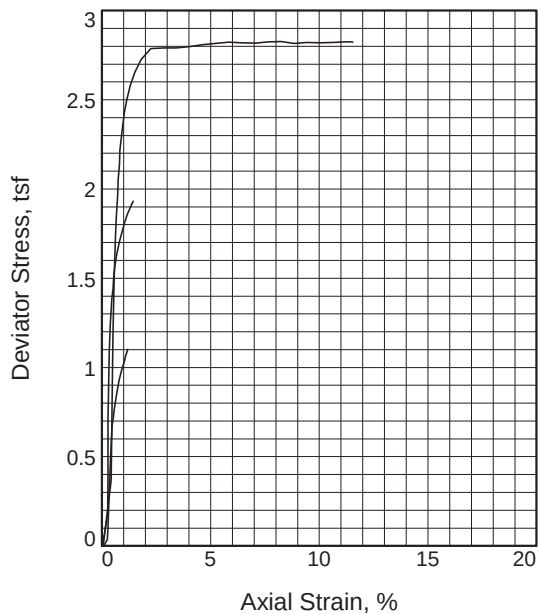
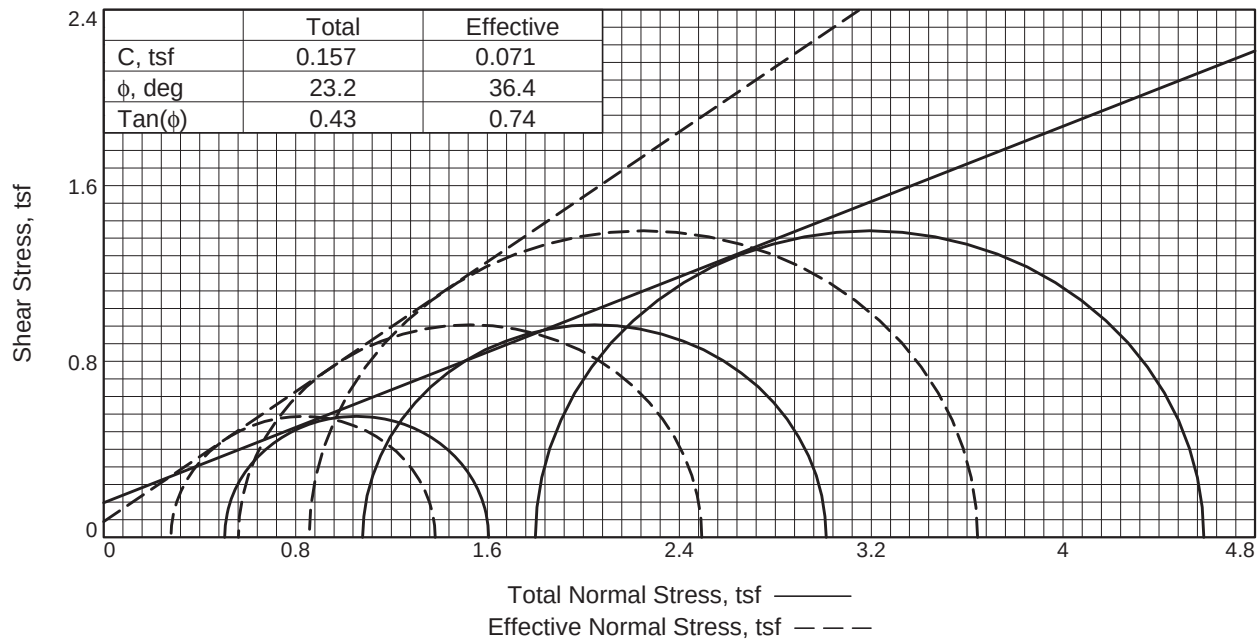
R&J Project: Amerex Labadie UWL

Sheet 5 of 5

Boring: Fly Ash Sample: Blank #2 Depth:

Rig: 1

Break Down



Sample No.		1	2	3
Initial	Water Content,	55.3	55.3	55.3
	Dry Density, pcf	58.3	58.3	58.3
	Saturation,	76.5	76.5	76.5
	Void Ratio	2.0726	2.0726	2.0726
	Diameter, in.	1.96	1.96	1.96
	Height, in.	3.65	3.65	3.65
At Test	Water Content,	69.0	68.7	68.7
	Dry Density, pcf	60.1	60.3	60.3
	Saturation,	100.0	100.0	100.0
	Void Ratio	1.9796	1.9721	1.9721
	Diameter, in.	1.94	1.95	1.97
	Height, in.	3.61	3.56	3.51
Strain rate, %/min.		0.20	0.10	0.08
Back Pressure, tsf		3.96	4.25	4.82
Cell Pressure, tsf		4.46	5.33	6.62
Fail. Stress, tsf		1.10	1.93	2.79
Total Pore Pr., tsf		4.18	4.77	5.77
Ult. Stress, tsf				
Total Pore Pr., tsf				
$\bar{\sigma}_1$ Failure, tsf		1.38	2.49	3.64
$\bar{\sigma}_3$ Failure, tsf		0.28	0.56	0.86

Type of Test:

CU with Pore Pressures

Sample Type: Hand Molded

Description: Ponded fly ash, air dried to 8% and molded at 55%

Assumed Specific Gravity= 2.87

Remarks: Staged Test

Client: Ameren Missouri

Project: CCP Properties, Labadie Plant

Source of Sample: Ponded Fly Ash

Sample Number: Bulk

Proj. No.: 2008012455

Date: 4/7/2011

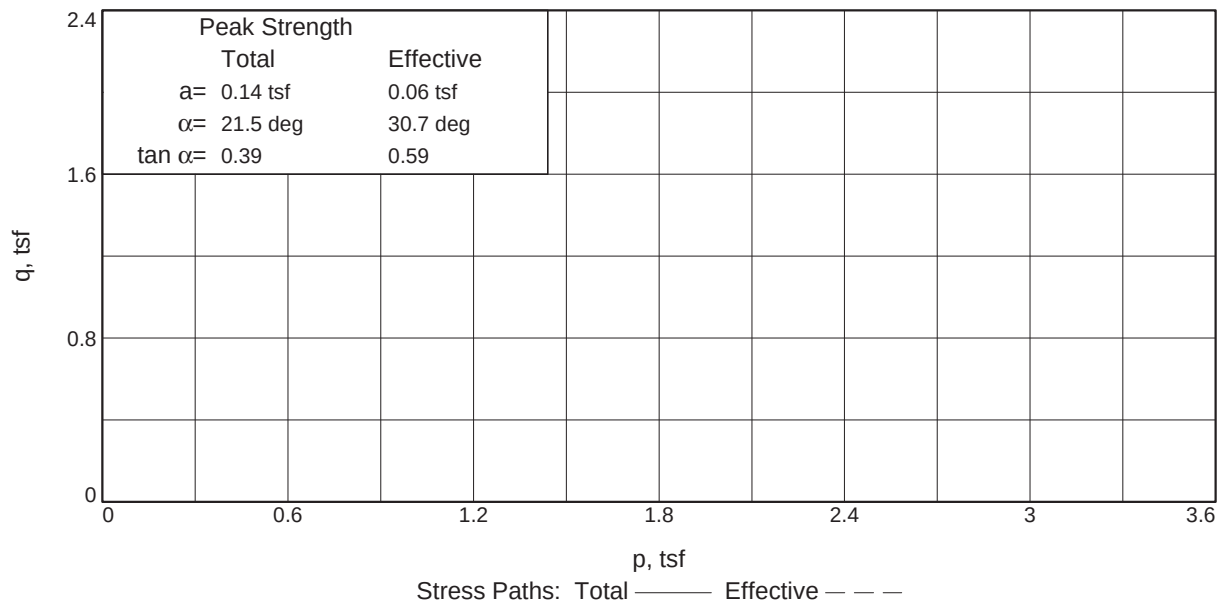
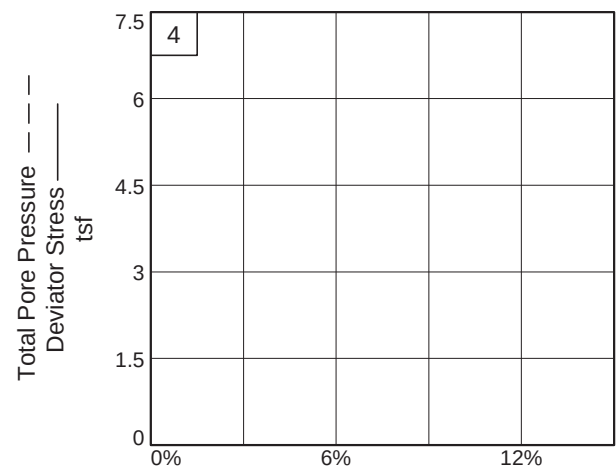
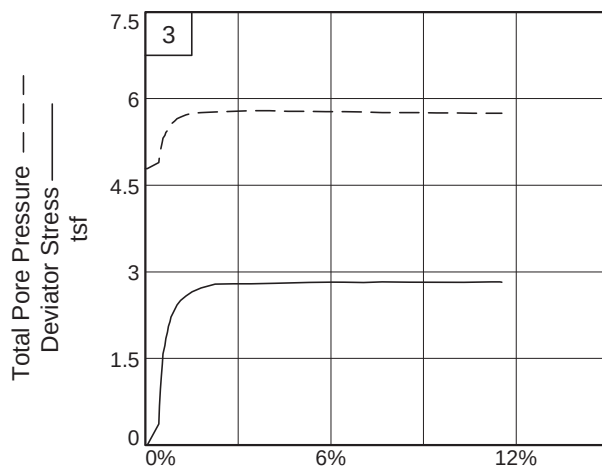
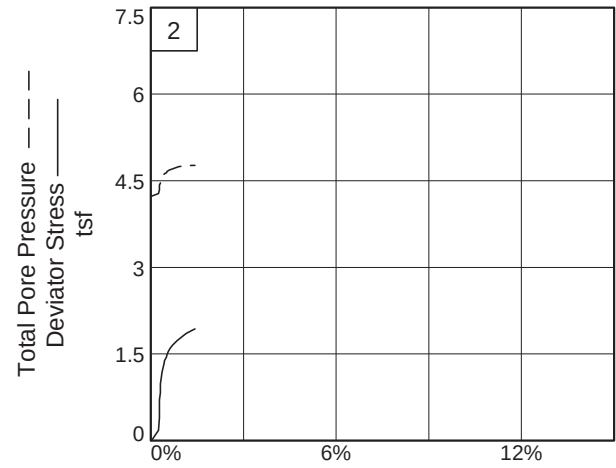
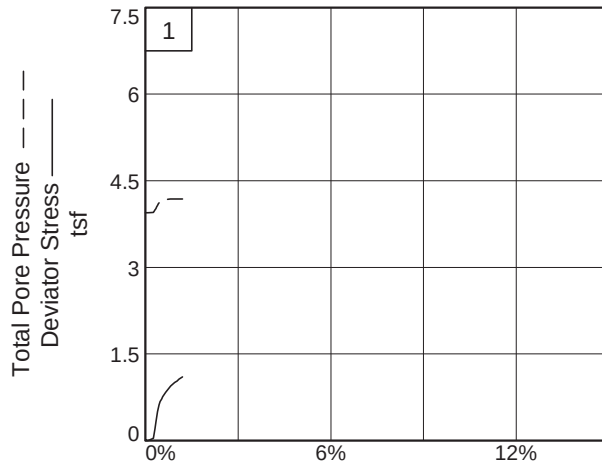


Figure _____

Tested By: K. Kocher

Checked By: J. Fouse

SCHEDULE CJG-ST1
B-7



Client: Ameren Missouri

Project: CCP Properties, Labadie Plant

Source of Sample: Ponded Fly Ash

Project No.: 2008012455

Sample Number: Bulk

Figure _____

REITZ & JENS, INC.

Tested By: K. Kocher

Checked By: J. Fouse

SCHEDULE CJG-ST1
B-7

TRIAXIAL COMPRESSION TEST

CU with Pore Pressures

5/23/2011

1:21 PM

Date: 4/7/2011
Client: Ameren Missouri
Project: CCP Properties, Labadie Plant
Project No.: 2008012455
Location: Ponded Fly Ash
Sample Number: Bulk
Description: Ponded fly ash, air dried to 8% and molded at 55%
Remarks: Staged Test
Type of Sample: Hand Molded

Assumed Specific Gravity=2.87**LL=****PL=****PI=****Test Method:** COE uniform strain (staged method triaxial test)**Parameters for Specimen No. 1**

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	342.950			487.550
Moisture content: Dry soil+tare, gms.	247.420			376.760
Moisture content: Tare, gms.	74.600			210.870
Moisture, %	55.3	69.7	69.0	66.8
Moist specimen weight, gms.	262.3			
Diameter, in.	1.96	1.95	1.94	
Area, in. ²	3.03	2.98	2.97	
Height, in.	3.65	3.62	3.61	
Net decrease in height, in.		0.03	0.01	
Wet Density, pcf	90.5	101.3	101.6	
Dry density, pcf	58.3	59.7	60.1	
Void ratio	2.0726	1.9996	1.9796	
Saturation, %	76.5	100.0	100.0	

Test Readings for Specimen No. 1

Consolidation cell pressure = 62.00 psi (4.464 tsf)
Consolidation back pressure = 55.00 psi (3.960 tsf)
Consolidation effective confining stress = 0.504 tsf
Strain rate, %/min. = 0.20
Fail. Stress = 1.101 tsf at reading no. 22

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress tsf	Minor Eff. Stress tsf	Major Eff. Stress tsf	1:3 Ratio	Pore Press. psi	P tsf	Q tsf
0	0.0040	16.00	0.0	0.0	0.000	0.518	0.518	1.00	54.80	0.518	0.000
1	0.0060	16.00	0.0	0.1	0.000	0.518	0.518	1.00	54.80	0.518	0.000
2	0.0070	16.00	0.0	0.1	0.000	0.518	0.518	1.00	54.80	0.518	0.000
3	0.0130	17.50	1.5	0.2	0.036	0.511	0.548	1.07	54.90	0.529	0.018
4	0.0140	20.30	4.3	0.3	0.104	0.497	0.601	1.21	55.10	0.549	0.052
5	0.0150	24.50	8.5	0.3	0.206	0.468	0.674	1.44	55.50	0.571	0.103
6	0.0160	28.80	12.8	0.3	0.310	0.446	0.756	1.69	55.80	0.601	0.155
7	0.0170	33.30	17.3	0.4	0.418	0.418	0.836	2.00	56.20	0.627	0.209
8	0.0180	36.40	20.4	0.4	0.493	0.389	0.882	2.27	56.60	0.635	0.247
9	0.0190	39.60	23.6	0.4	0.571	0.360	0.931	2.58	57.00	0.645	0.285
10	0.0200	42.20	26.2	0.4	0.633	0.346	0.979	2.83	57.20	0.662	0.317
11	0.0210	44.00	28.0	0.5	0.677	0.324	1.001	3.09	57.50	0.662	0.338
12	0.0230	45.90	29.9	0.5	0.722	0.310	1.032	3.33	57.70	0.671	0.361
13	0.0240	47.40	31.4	0.6	0.758	0.302	1.060	3.51	57.80	0.681	0.379
14	0.0250	48.70	32.7	0.6	0.789	0.295	1.084	3.67	57.90	0.690	0.395
15	0.0280	51.00	35.0	0.7	0.844	0.288	1.132	3.93	58.00	0.710	0.422
16	0.0300	53.00	37.0	0.7	0.892	0.288	1.180	4.10	58.00	0.734	0.446
17	0.0330	54.70	38.7	0.8	0.932	0.281	1.213	4.32	58.10	0.747	0.466
18	0.0350	56.30	40.3	0.9	0.970	0.281	1.251	4.45	58.10	0.766	0.485
19	0.0380	57.60	41.6	0.9	1.000	0.281	1.281	4.56	58.10	0.781	0.500
20	0.0410	58.90	42.9	1.0	1.031	0.281	1.312	4.67	58.10	0.796	0.515
21	0.0430	60.30	44.3	1.1	1.064	0.281	1.345	4.79	58.10	0.813	0.532
22	0.0470	61.90	45.9	1.2	1.101	0.281	1.382	4.92	58.10	0.831	0.550

Parameters for Specimen No. 2

Specimen Parameter	Initial	Cum. for Test	Consolidated	Final
Moisture content: Moist soil+tare, gms.	342.950			487.550
Moisture content: Dry soil+tare, gms.	247.420			376.760
Moisture content: Tare, gms.	74.600			210.870
Moisture, %	55.3		68.7	66.8
Moist specimen weight, gms.	262.3			
Diameter, in.	1.96		1.95	
Area, in. ²	3.03		3.00	
Height, in.	3.65		3.56	
Net decrease in height, in.		0.08	0.00	
Wet Density, pcf	90.5		101.7	
Dry density, pcf	58.3		60.3	
Void ratio	2.0726		1.9721	
Saturation, %	76.5		100.0	

Test Readings for Specimen No. 2

Consolidation cell pressure = 74.00 psi (5.328 tsf)

Consolidation back pressure = 59.00 psi (4.248 tsf)

Consolidation effective confining stress = 1.080 tsf

Strain rate, %/min. = 0.10

Fail. Stress = 1.932 tsf at reading no. 22

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress tsf	Minor Eff. Stress tsf	Major Eff. Stress tsf	1:3 Ratio	Pore Press. psi	P tsf	Q tsf
0	0.0040	19.10	0.0	0.0	0.000	1.094	1.094	1.00	58.80	1.094	0.000
1	0.0050	19.30	0.2	0.0	0.005	1.094	1.099	1.00	58.80	1.097	0.002
2	0.0130	26.50	7.4	0.3	0.177	1.051	1.229	1.17	59.40	1.140	0.089
3	0.0140	35.40	16.3	0.3	0.391	0.986	1.377	1.40	60.30	1.182	0.195
4	0.0140	42.70	23.6	0.3	0.565	0.943	1.509	1.60	60.90	1.226	0.283
5	0.0140	48.50	29.4	0.3	0.704	0.900	1.604	1.78	61.50	1.252	0.352
6	0.0150	53.60	34.5	0.3	0.826	0.871	1.698	1.95	61.90	1.284	0.413
7	0.0150	60.00	40.9	0.3	0.980	0.828	1.808	2.18	62.50	1.318	0.490
8	0.0160	64.80	45.7	0.3	1.094	0.792	1.886	2.38	63.00	1.339	0.547
9	0.0170	68.40	49.3	0.4	1.180	0.763	1.943	2.55	63.40	1.353	0.590
10	0.0180	71.40	52.3	0.4	1.252	0.742	1.993	2.69	63.70	1.367	0.626
11	0.0190	74.40	55.3	0.4	1.323	0.720	2.043	2.84	64.00	1.382	0.662
12	0.0200	77.00	57.9	0.4	1.385	0.706	2.090	2.96	64.20	1.398	0.692
13	0.0220	79.50	60.4	0.5	1.444	0.691	2.135	3.09	64.40	1.413	0.722
14	0.0230	81.60	62.5	0.5	1.494	0.670	2.163	3.23	64.70	1.416	0.747
15	0.0250	84.70	65.6	0.6	1.567	0.648	2.215	3.42	65.00	1.431	0.783
16	0.0280	87.40	68.3	0.7	1.630	0.626	2.256	3.60	65.30	1.441	0.815
17	0.0320	90.20	71.1	0.8	1.695	0.605	2.300	3.80	65.60	1.452	0.847
18	0.0360	92.80	73.7	0.9	1.755	0.583	2.338	4.01	65.90	1.461	0.877
19	0.0410	95.10	76.0	1.0	1.807	0.576	2.383	4.14	66.00	1.480	0.904
20	0.0450	97.30	78.2	1.2	1.857	0.569	2.426	4.27	66.10	1.497	0.929
21	0.0520	99.70	80.6	1.3	1.910	0.562	2.472	4.40	66.20	1.517	0.955
22	0.0550	100.70	81.6	1.4	1.932	0.562	2.494	4.44	66.20	1.528	0.966

Parameters for Specimen No. 3

Specimen Parameter	Initial	Cum. for Test	Consolidated	Final
Moisture content: Moist soil+tare, gms.	342.950			487.550
Moisture content: Dry soil+tare, gms.	247.420			376.760
Moisture content: Tare, gms.	74.600			210.870
Moisture, %	55.3		68.7	66.8
Moist specimen weight, gms.	262.3			
Diameter, in.	1.96		1.97	
Area, in. ²	3.03		3.04	
Height, in.	3.65		3.51	
Net decrease in height, in.		0.13	0.00	
Wet Density, pcf	90.5		101.7	
Dry density, pcf	58.3		60.3	
Void ratio	2.0726		1.9721	
Saturation, %	76.5		100.0	

Test Readings for Specimen No. 3

Consolidation cell pressure = 92.00 psi (6.624 tsf)

Consolidation back pressure = 67.00 psi (4.824 tsf)

Consolidation effective confining stress = 1.800 tsf

Strain rate, %/min. = 0.08

Fail. Stress = 2.787 tsf at reading no. 20

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress tsf	Minor Eff. Stress tsf	Major Eff. Stress tsf	1:3 Ratio	Pore Press. psi	P tsf	Q tsf
0	0.0040	23.80	0.0	0.0	0.000	1.836	1.836	1.00	66.50	1.836	0.000
1	0.0060	23.80	0.0	0.1	0.000	1.836	1.836	1.00	66.50	1.836	0.000
2	0.0190	39.40	15.6	0.4	0.368	1.728	2.096	1.21	68.00	1.912	0.184
3	0.0200	52.50	28.7	0.5	0.677	1.620	2.297	1.42	69.50	1.958	0.338
4	0.0210	64.90	41.1	0.5	0.969	1.526	2.495	1.63	70.80	2.011	0.484
5	0.0220	74.70	50.9	0.5	1.199	1.447	2.646	1.83	71.90	2.047	0.600
6	0.0230	83.40	59.6	0.5	1.404	1.368	2.772	2.03	73.00	2.070	0.702
7	0.0240	90.80	67.0	0.6	1.578	1.310	2.888	2.20	73.80	2.099	0.789
8	0.0260	97.10	73.3	0.6	1.725	1.260	2.985	2.37	74.50	2.123	0.863
9	0.0270	102.20	78.4	0.7	1.845	1.210	3.054	2.52	75.20	2.132	0.922
10	0.0290	107.00	83.2	0.7	1.956	1.174	3.130	2.67	75.70	2.152	0.978
11	0.0300	111.30	87.5	0.7	2.057	1.130	3.187	2.82	76.30	2.159	1.028
12	0.0320	114.90	91.1	0.8	2.140	1.102	3.242	2.94	76.70	2.172	1.070
13	0.0330	118.10	94.3	0.8	2.215	1.066	3.280	3.08	77.20	2.173	1.107
14	0.0370	123.50	99.7	0.9	2.339	1.015	3.354	3.30	77.90	2.185	1.169
15	0.0400	127.40	103.6	1.0	2.428	0.972	3.400	3.50	78.50	2.186	1.214
16	0.0440	130.70	106.9	1.1	2.503	0.943	3.446	3.65	78.90	2.195	1.251
17	0.0500	134.30	110.5	1.3	2.583	0.907	3.490	3.85	79.40	2.199	1.291
18	0.0570	137.60	113.8	1.5	2.654	0.878	3.533	4.02	79.80	2.206	1.327
19	0.0670	140.90	117.1	1.8	2.723	0.864	3.587	4.15	80.00	2.226	1.362
20	0.0830	144.20	120.4	2.2	2.787	0.857	3.644	4.25	80.10	2.250	1.394
21	0.1040	145.10	121.3	2.8	2.791	0.842	3.633	4.31	80.30	2.238	1.395
22	0.1240	145.80	122.0	3.4	2.791	0.835	3.626	4.34	80.40	2.230	1.395
23	0.1450	146.90	123.1	4.0	2.798	0.835	3.633	4.35	80.40	2.234	1.399
24	0.1660	148.10	124.3	4.6	2.808	0.842	3.650	4.33	80.30	2.246	1.404
25	0.1870	149.20	125.4	5.2	2.815	0.842	3.657	4.34	80.30	2.250	1.407
26	0.2090	150.40	126.6	5.8	2.823	0.850	3.673	4.32	80.20	2.261	1.412

Test Readings for Specimen No. 3

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress tsf	Minor Eff. Stress tsf	Major Eff. Stress tsf	1:3 Ratio	Pore Press. psi	P tsf	Q tsf
27	0.2300	151.00	127.2	6.4	2.819	0.850	3.668	4.32	80.20	2.259	1.409
28	0.2520	151.80	128.0	7.1	2.817	0.857	3.674	4.29	80.10	2.265	1.409
29	0.2730	153.00	129.2	7.7	2.825	0.864	3.689	4.27	80.00	2.277	1.413
30	0.2940	153.90	130.1	8.3	2.827	0.864	3.691	4.27	80.00	2.277	1.413
31	0.3140	154.20	130.4	8.8	2.816	0.864	3.680	4.26	80.00	2.272	1.408
32	0.3350	155.30	131.5	9.4	2.821	0.871	3.692	4.24	79.90	2.282	1.410
33	0.3560	156.10	132.3	10.0	2.819	0.871	3.690	4.24	79.90	2.281	1.410
34	0.3760	157.00	133.2	10.6	2.820	0.878	3.699	4.21	79.80	2.289	1.410
35	0.3970	158.10	134.3	11.2	2.825	0.878	3.703	4.22	79.80	2.291	1.412
36	0.4070	158.50	134.7	11.5	2.824	0.878	3.702	4.21	79.80	2.290	1.412
37	0.4090	158.50	134.7	11.5	2.822	0.878	3.700	4.21	79.80	2.289	1.411

TRIAXIAL CELL SETUP & TAKEDOWN

Project Amir Khan Labadie UWL Date 4-11-11
 Sample Labadie Ponded Ash Depth _____
 Description 100% Labadie Ponded Ash Aie dried to $\approx 8\%$, then molded at 65% M

Type of Test Standard CW Confining Pressure Differential 7, 15, 25 psi
 Cell Number 2 Saturate before after Consolidation _____
 Number of Membranes 2 Filter Strips Yes No

MOISTURE CONTENT			
	INITIAL		FINAL
Tare No.	R 44	B-3	Box 2
Wet Wt. + Tare	155.26	187.69	487.55
Dry Wt. + Tare	111.74	135.66	379.74
Wt. Water			
Tare Wt.	33.97	40.63	210.87
Dry Soil Wt.			*168.89
Moisture %	55.920	54.751	63.823
Avg. w %	55.3		63.8

SPECIMEN DIMENSIONS in. / mm.				
HEIGHT			DIAMETER	
	Initial	Final	Initial	Final
1	3.6380		T 1.9630	
2	3.6445		M 1.9620	
3	3.6530		B 1.9650	
Avg.	3.64517		1.96333	

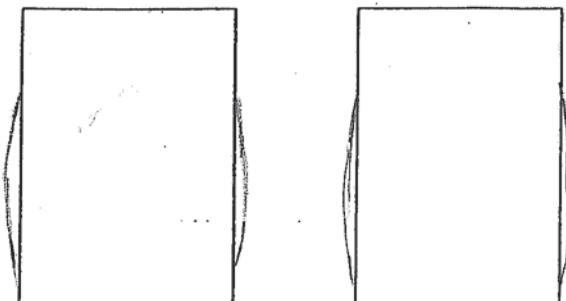
LENGTH CHANGE	
STRAIN GAUGE at setup	500
at saturation start	500
at consolidation start	529
at axial load start	537

MASS PROPERTIES		
Wt. Tube + Soil		gm.
Wt. Tube		gm.
Wt. Soil	262.29	gm.
Tube Diameter		in.
Sample Length		in.
tube length		in.
top trim		in.
bottom trim		in.
total trim		in.
sample length		in.
Density constant		
$4.85 / (D^2 * L)$		
Wet Density		pcf.
Dry Density		pcf.

Description After Test Initial $\gamma_m = 90.5$
 $\gamma_m = 55.3$
 $\gamma_b = 58.3$

Remarks * Sample is very fragile will use dig wt after test to determine Density

Failure Sketch



Trimmed By KPK
 Trimmed Date 4-11-2011

Setup By KPK
 Setup Date 4-11-2011

Taken Down By KPK
 Take Down Date 4-11-11

SCHEDULE CIG-ST1

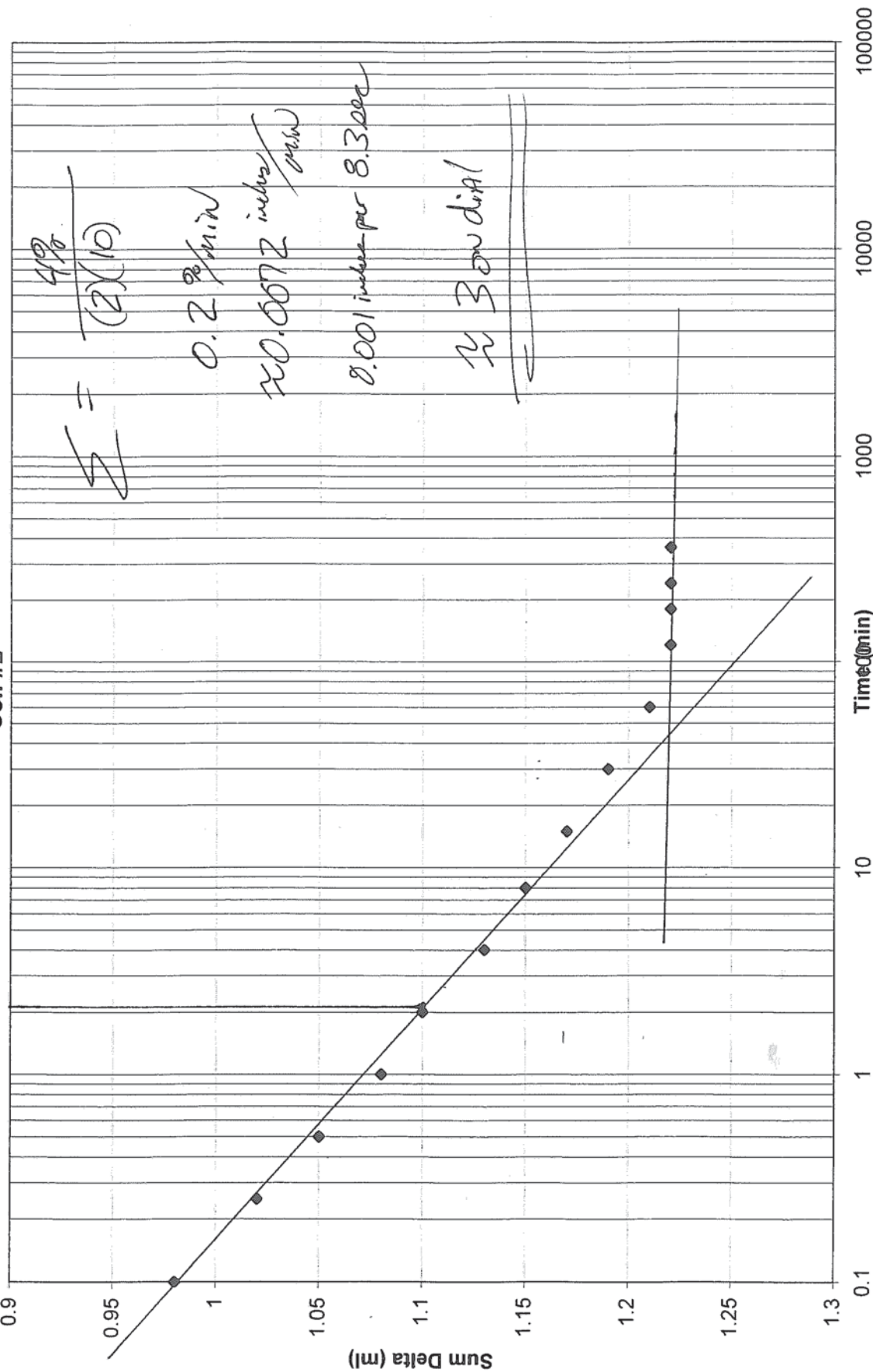
INITIAL TRANSDUCER READING 50.3 TRANSDUCER NUMBER 2

SCHEDULE CJG-ST1
Sheet _____ of B-7

Amesex Labradie UWL Pooled Fly Ash

17psi Sample

Cell #2



DATE 4-15-11

PROJECT Ameren Lebaite UWE

SAMPLE Powdered Fly Ash DEPTH _____

INITIAL CELL PRESSURE 62.0 CELL NUMBER 2

INITIAL PORE PRESSURE 55.0 START DATE 4-15-11

SAMPLE HEIGHT: AT SETUP _____ AT START OF LOADING 3.6082

STRAIN RATE 0.2 %/min TYPE OF TEST Steady CW

[illegible]

MASS OF TOP CAP & POROUS STONE: _____ g.

~~SCHEDULE CJG-ST1~~

TRIAXIAL CELL CONSOLIDATION TEST

STRAIN @ CONSOLIDATION 50%

@ AXIAL LOADING 50%

PROJECT American Lebanese UML

SAMPLE Paved Fly Ash DEPTH _____

CONSOLIDATION CELL PRESSURE 74.0 CELL NUMBER 2

CONSOLIDATION PORE PRESSURE 59.0

15 psi strain

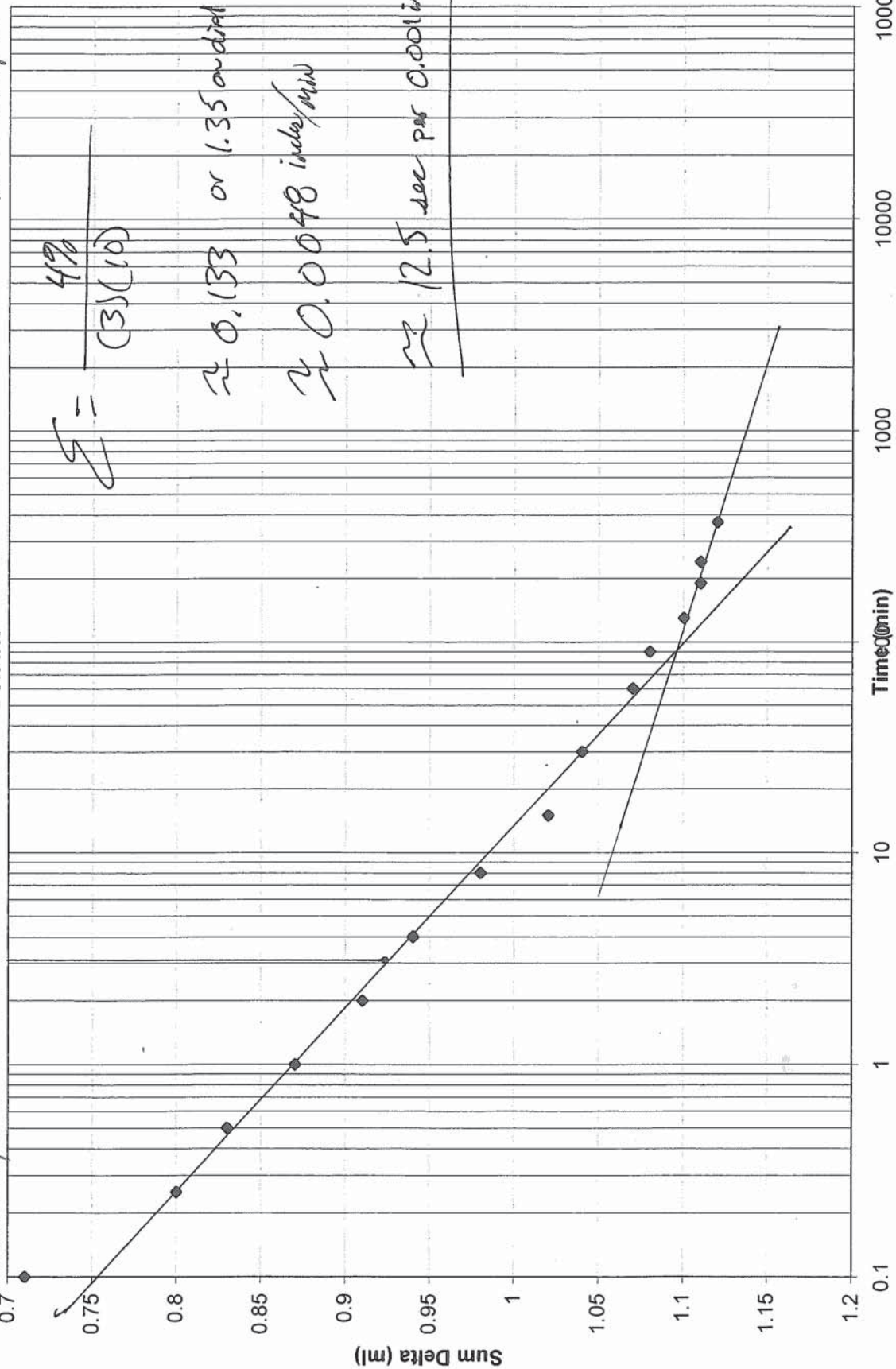
DATE	TIME	BURETTE READING	DELTA VOLUME	SUM DELTA VOLUME	DELTA TIME	TEMP	REMARKS
4-15-11	9:00	10.00			0		
		9.29			.1		
		9.20			.25		
		9.17			.5		
	9:01	9.13			1		
	9:02	9.09			2		
	9:04	9.06			4		
	9:08	9.02			8		
	9:15	8.98			15		
	9:30	8.96			30		
	10:00	8.93			60		
	10:30	8.92			90		
	11:10	8.90			130		
	12:10	8.89			190		
	13:00	8.89			240		
	15:10	8.88			370		
4-18-11	7:10	8.88					

SCHEDULE CIG-ST1

American Labradie UWL
Powdered Fly Ash $\log = 2.5$ min

15 psi Sample

Cell #2



DATE 4-20-11

PROVING RING

AMEREN LABADRE UWL

Ponded Fly Ash

DEPTH

74.0

2

59.0

START DATE

4-20-2011

AT START OF

LOADING 3.60

0.13

TYPE OF TEST

Strapped CU

[illegible]

MASS OF TOP CAP & POROUS STONE: _____ g.

~~SCHEDULE CJG-ST1~~
B-7

@ Axial Loading 500

DEPTH

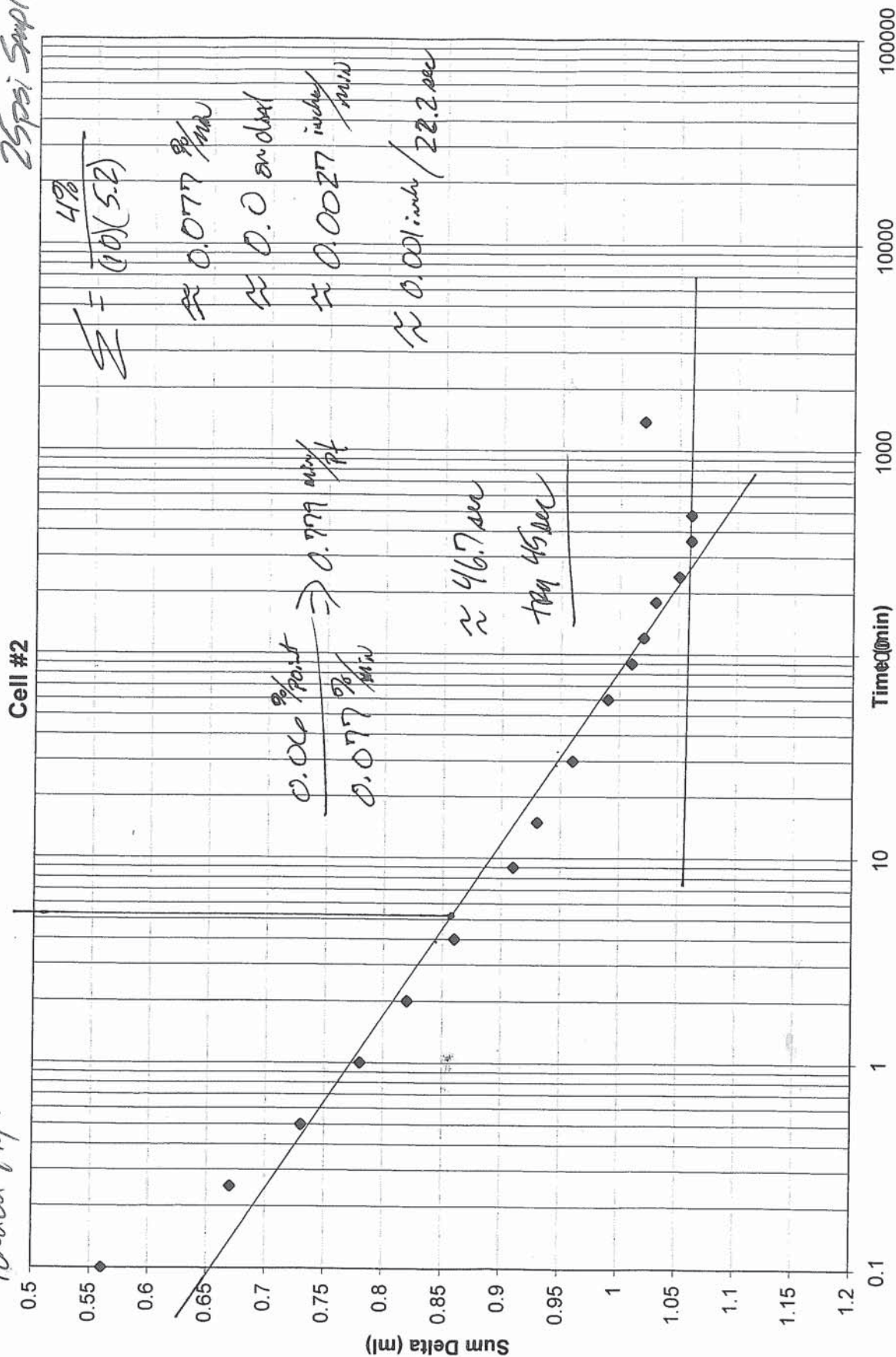
CELL NUMBER 2

25 psi 5AFL

~~100~~
~~1375~~

Amesbury Labadie UMW
Ponded Fly Ash

25psi Sample



DATE 4-21-11

PROVING RING

PROJECT AMEREN LABADIE MWL

SAMPLE Powdered Fly Ash

DEPTH

INITIAL CELL PRESSURE 92.0

CELL NUMBER 2

INITIAL PORE PRESSURE 67.0

START DATE 4-21-11

SAMPLE HEIGHT: AT SETUP

AT START OF LOADING ≈ 3.58

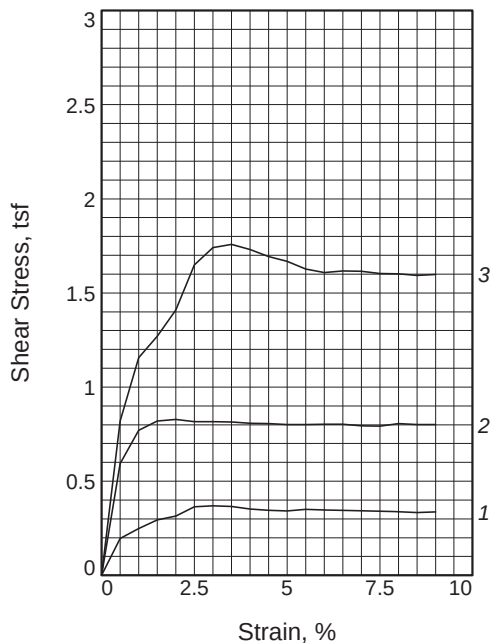
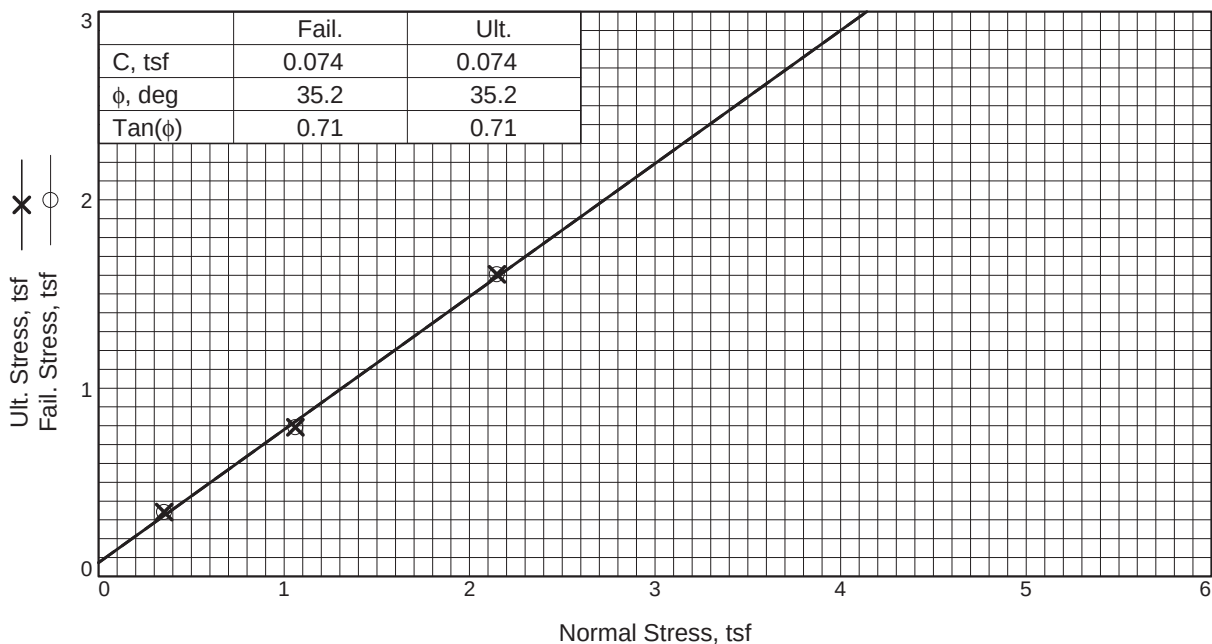
STRAIN RATE 0.077 $\frac{\%}{\text{min}}$

TYPE OF TEST Staged CW test

[illegible]

MASS OF TOP CAP & POROUS STONE: _____ g

~~SCHEDULE CJG-ST1~~



Sample No.		1	2	3
Initial	Water Content, %	58.8	58.8	58.8
	Dry Density, pcf	59.8	60.7	62.7
	Saturation, %	84.7	86.6	90.9
	Void Ratio	1.9947	1.9496	1.8577
	Diameter, in.	2.00	2.00	2.00
	Height, in.	1.31	1.31	1.31
At Test	Water Content, %	57.0	56.2	55.2
	Dry Density, pcf	59.8	60.7	62.7
	Saturation, %	82.1	82.8	85.3
	Void Ratio	1.9947	1.9496	1.8577
	Diameter, in.	2.00	2.00	2.00
	Height, in.	1.31	1.31	1.31
Normal Stress, tsf		0.354	1.061	2.148
Fail. Stress, tsf		0.342	0.792	1.604
Strain, %		7.5	7.5	7.5
Ult. Stress, tsf		0.342	0.792	1.604
Strain, %		7.5	7.5	7.5
Strain rate, %/min.		0.80	0.80	0.80

Sample Type: Hand Compacted

Description: Ponded fly-ash, air dried to 8% and molded at 55%

Specific Gravity= 2.87

Remarks: Direct shear with textured liner material

Client: Ameren Missouri

Project: CCP Properties, Labadie Plant

Source of Sample: Ponded Fly Ash

Sample Number: Bulk

Proj. No.: 2008012455

Date: 4/26/11



Figure _____

Tested By: J. Crose

Checked By: K. Kocher

SCHEDULE CJG-ST1
B-8

DIRECT SHEAR TEST

5/23/2011

Date: 4/26/11
Client: Ameren Missouri
Project: CCP Properties, Labadie Plant
Project No.: 2008012455
Location: Ponded Fly Ash
Sample Number: Bulk
Description: Ponded fly-ash, air dried to 8% and molded at 55%
Remarks: Direct shear with textured liner material
Type of Sample: Hand Compacted
Specific Gravity=2.87 **LL=** **PL=** **PI=**

Parameters for Specimen No. 1

Specimen Parameter	Initial	Consolidated	Final
Moisture content: Moist soil+tare, gms.	108.330		123.830
Moisture content: Dry soil+tare, gms.	76.200		86.810
Moisture content: Tare, gms.	21.590		21.900
Moisture, %	58.8	57.0	57.0
Moist specimen weight, gms.	102.7		
Diameter, in.	2.00	2.00	
Area, in. ²	3.14	3.14	
Height, in.	1.31	1.31	
Net decrease in height, in.		0.00	
Wet Density, pcf	95.0	94.0	
Dry density, pcf	59.8	59.8	
Void ratio	1.9947	1.9947	
Saturation, %	84.7	82.1	

Test Readings for Specimen No. 1

Primary load ring constant = .1176 lbs. per input unit

Normal stress = 0.3537 tsf

Strain rate, %/min. = 0.80

Fail. Stress = 0.342 tsf at reading no. 15

Ult. Stress = 0.342 tsf at reading no. 15

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Strain %	Shear Stress tsf
0	0.0000	2.0	0.0	0.0	0.000
1	0.0100	75.0	8.6	0.5	0.197
2	0.0200	94.0	10.8	1.0	0.248
3	0.0300	111.0	12.8	1.5	0.294
4	0.0400	119.0	13.8	2.0	0.315
5	0.0500	137.0	15.9	2.5	0.364
6	0.0600	139.0	16.1	3.0	0.369
7	0.0700	138.0	16.0	3.5	0.367
8	0.0800	133.0	15.4	4.0	0.353
9	0.0900	130.0	15.1	4.5	0.345
10	0.1000	129.0	14.9	5.0	0.342
11	0.1100	132.0	15.3	5.5	0.350
12	0.1200	131.0	15.2	6.0	0.348

Test Readings for Specimen No. 1

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Strain %	Shear Stress tsf
13	0.1300	130.0	15.1	6.5	0.345
14	0.1400	129.0	14.9	7.0	0.342
15	0.1500	129.0	14.9	7.5	0.342
16	0.1600	127.0	14.7	8.0	0.337
17	0.1700	126.0	14.6	8.5	0.334
18	0.1800	127.0	14.7	9.0	0.337

Parameters for Specimen No. 2

Specimen Parameter	Initial	Consolidated	Final
Moisture content: Moist soil+tare, gms.	108.330		124.010
Moisture content: Dry soil+tare, gms.	76.200		87.360
Moisture content: Tare, gms.	21.590		22.180
Moisture, %	58.8	56.2	56.2
Moist specimen weight, gms.	104.2		
Diameter, in.	2.00	2.00	
Area, in. ²	3.14	3.14	
Height, in.	1.31	1.31	
Net decrease in height, in.		0.00	
Wet Density, pcf	96.5	94.9	
Dry density, pcf	60.7	60.7	
Void ratio	1.9496	1.9496	
Saturation, %	86.6	82.8	

Test Readings for Specimen No. 2

Primary load ring constant = .1176 lbs. per input unit

Normal stress = 1.061 tsf

Strain rate, %/min. = 0.80

Fail. Stress = 0.792 tsf at reading no. 15

Ult. Stress = 0.792 tsf at reading no. 15

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Strain %	Shear Stress tsf
0	0.0000	1.0	0.0	0.0	0.000
1	0.0100	221.0	25.9	0.5	0.593
2	0.0200	287.0	33.6	1.0	0.771
3	0.0300	305.0	35.8	1.5	0.819
4	0.0400	308.0	36.1	2.0	0.827
5	0.0500	304.0	35.6	2.5	0.817
6	0.0600	304.0	35.6	3.0	0.817
7	0.0700	303.0	35.5	3.5	0.814
8	0.0800	301.0	35.3	4.0	0.809
9	0.0900	300.0	35.2	4.5	0.806
10	0.1000	298.0	34.9	5.0	0.800
11	0.1100	298.0	34.9	5.5	0.800
12	0.1200	299.0	35.0	6.0	0.803
13	0.1300	299.0	35.0	6.5	0.803
14	0.1400	296.0	34.7	7.0	0.795
15	0.1500	295.0	34.6	7.5	0.792
16	0.1600	300.0	35.2	8.0	0.806

Test Readings for Specimen No. 2

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Strain %	Shear Stress tsf
17	0.1700	298.0	34.9	8.5	0.800
18	0.1800	298.0	34.9	9.0	0.800

Parameters for Specimen No. 3

Specimen Parameter	Initial	Consolidated	Final
Moisture content: Moist soil+tare, gms.	108.330		126.110
Moisture content: Dry soil+tare, gms.	76.200		88.940
Moisture content: Tare, gms.	21.590		21.600
Moisture, %	58.8	55.2	55.2
Moist specimen weight, gms.	107.6		
Diameter, in.	2.00	2.00	
Area, in. ²	3.14	3.14	
Height, in.	1.31	1.31	
Net decrease in height, in.		0.00	
Wet Density, pcf	99.6	97.3	
Dry density, pcf	62.7	62.7	
Void ratio	1.8577	1.8577	
Saturation, %	90.9	85.3	

Test Readings for Specimen No. 3

Primary load ring constant = .1176 lbs. per input unit

Normal stress = 2.148 tsf

Strain rate, %/min. = 0.80

Fail. Stress = 1.604 tsf at reading no. 15

Ult. Stress = 1.604 tsf at reading no. 15

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Strain %	Shear Stress tsf
0	0.0000	1.0	0.0	0.0	0.000
1	0.0100	305.0	35.8	0.5	0.819
2	0.0200	430.0	50.5	1.0	1.156
3	0.0300	472.0	55.4	1.5	1.269
4	0.0400	524.0	61.5	2.0	1.410
5	0.0500	613.0	72.0	2.5	1.649
6	0.0600	647.0	76.0	3.0	1.741
7	0.0700	653.0	76.7	3.5	1.757
8	0.0800	643.0	75.5	4.0	1.730
9	0.0900	629.0	73.9	4.5	1.693
10	0.1000	620.0	72.8	5.0	1.668
11	0.1100	605.0	71.0	5.5	1.628
12	0.1200	598.0	70.2	6.0	1.609
13	0.1300	601.0	70.6	6.5	1.617
14	0.1400	600.0	70.4	7.0	1.614
15	0.1500	596.0	70.0	7.5	1.604
16	0.1600	595.0	69.9	8.0	1.601
17	0.1700	592.0	69.5	8.5	1.593
18	0.1800	594.0	69.7	9.0	1.598

DIRECT SHEAR

job
date

Ameren LABADIE UWL
4-26-11

Sample Description

FLY ASH lightly compacted "POUNDED"

Sample + Tare Start
Sample + Tare Finish
Sample Used

4183.63
4183.63
102.66

TARE 4080.97

BLOCK MEASUREMENT

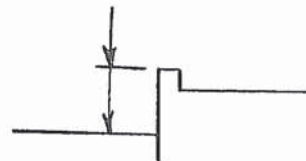
Projection Start
Projection Finish

Volume of Sample

Dry Density

CONFINING (Vertical) LOAD

7.0 Kg



Diam = 2.0"
L = 1.31"

$$P = 45 \times \frac{N}{840} + \left[\frac{(N-840)}{840} \times 0.353 \right]$$

LOAD DIAL	HZ. STRAIN DIAL	VERT. STRAIN DIAL
002	0	
085	10	
094	20	
111	30	
119	40	
137	50	
139	60	
138	70	
133	80	
130	90	
129	100	
132	110	
131	120	
130	130	
129	140	
129	150	
127	160	
126	170	
127	180	

SCHEDULE C/JG-ST1
B-8

DIRECT SHEAR

job AMERICAN LABADIE UWL
 date 4/26/11

Sample Description lightly compacted "ponded"
fly ash

Sample + Tare Start
 Sample + Tare Finish
 Sample Used

4185.20
104.23

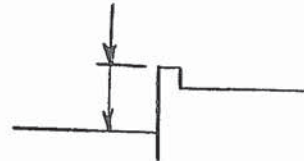
TARE 4080.97

BLOCK MEASUREMENT

Projection Start _____
 Projection Finish _____

Volume of Sample _____ Dry Density _____

CONFINING (Vertical) LOAD 21 Kg



$$P = 45 \times \frac{N}{840} + [(N-840) \times 0.353]$$

LOAD DIAL	HZ. STRAIN DIAL	VERT. STRAIN DIAL	
001	0		
221	10		
287	20		
305	30		
308	40		
304	50		
304	60		
303	70		
301	80		
300	90		
298	100		
298	110		
299	120		
299	130		
296	140		
295	150		
300	160		
298	170		
298	180		

JHK
KEK

DIRECT SHEAR

job
date

America LABADIE UWL

4/24/11

Sample Description

fly ash lightly compacted "ponded"

Sample + Tare Start
Sample + Tare Finish
Sample Used

4188.55

Ther 4080.97

107.56

BLOCK MEASUREMENT

Projection Start
Projection Finish

N/A

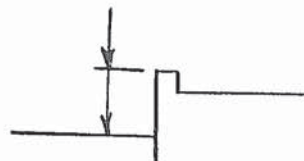
N/A

Volume of Sample

Dry Density

CONFINING (Vertical) LOAD

42.5 Kg



$$P = 45 \times \frac{N}{840} + \left[(N-840) \times 0.353 \right]$$

LOAD DIAL	HZ. STRAIN DIAL	VERT. STRAIN DIAL
001	0	
305	10	
430	20	
472	30	
524	40	
613	50	
647	60	
653	70	
643	80	
629	90	
620	100	
605	110	
598	120	
601	130	
600	140	
596	150	
595	160	
592	170	
594	180	

ATTERBERG LIMITS & MOISTURE CONTENT

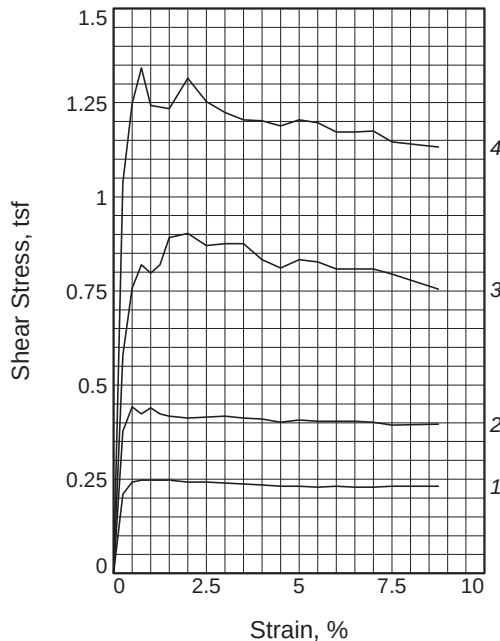
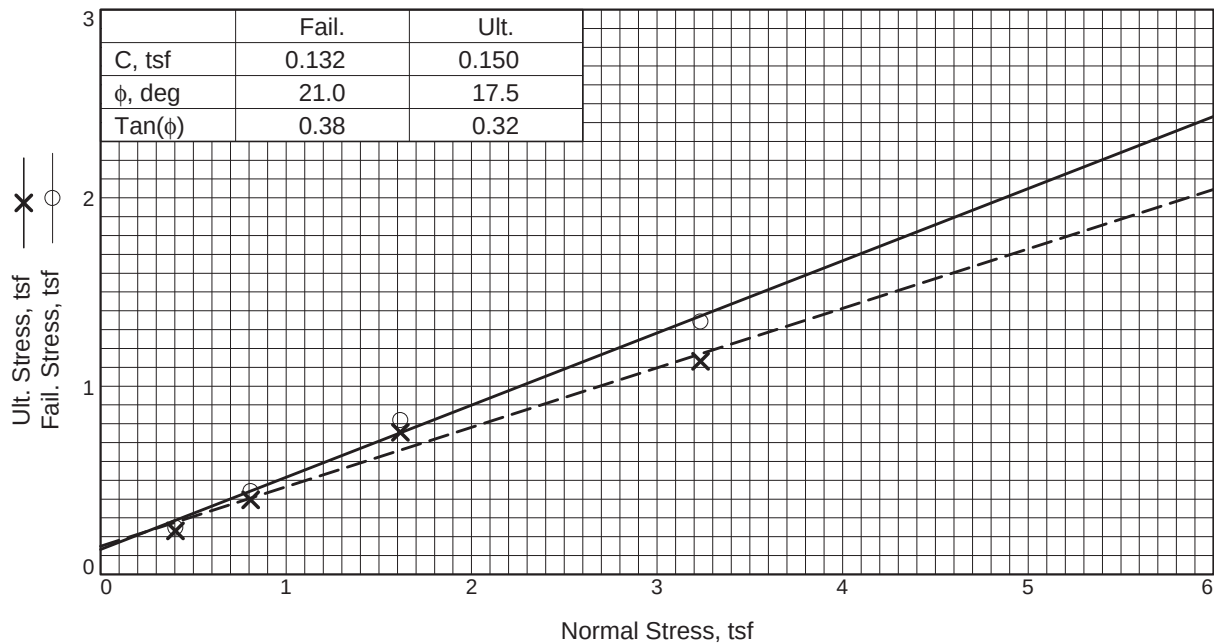
Job: Ameren LAPODE UWL Date: 4/26/11
 Location: POINTE FLACH @ +459.71 Test By: [Signature]
 Checked: KOL Date: 4-27-11

Test Hole	7Kg	21Kg	42.5Kg
Depth			
Type of Test			
Container No.	<u>75</u>	<u>12</u>	<u>30</u>
No. of Blows			<u>79</u>
Wt. Wet + Tare	<u>108.33</u>	<u>123.83</u>	<u>124.01</u>
Wt. Dry + Tare	<u>76.20</u>	<u>86.81</u>	<u>87.36</u>
Wt. Water			<u>88.94</u>
Tare	<u>21.57</u>	<u>21.90</u>	<u>22.18</u>
Wt. Dry Soil			<u>21.60</u>
% Moisture			
Liquid Limit			
Average Limits			

Test Hole			
Depth			
Type of Test			
Container No.			
No. of Blows			
Wt. Wet + Tare			
Wt. Dry + Tare			
Wt. Water			
Tare			
Wt. Dry Soil			
% Moisture			
Liquid Limit			
Average Limits			

Test Hole			
Depth			
Type of Test			
Container No.			
No. of Blows			
Wt. Wet + Tare			
Wt. Dry + Tare			
Wt. Water			
Tare			
Wt. Dry Soil			
% Moisture			
Liquid Limit			
Average Limits			

Remarks: _____



Sample No.		1	2	3	4
Initial	Water Content, %	56.5	56.6	56.6	55.8
	Dry Density, pcf	59.5	59.6	59.4	60.4
	Saturation, %	80.6	80.9	80.5	81.3
	Void Ratio	2.0116	2.0080	2.0178	1.9675
	Diameter, in.	2.00	2.00	2.00	2.00
	Height, in.	1.31	1.31	1.31	1.31
At Test	Water Content, %	56.5	56.6	58.4	55.8
	Dry Density, pcf	59.5	59.6	59.4	60.4
	Saturation, %	80.6	80.9	83.1	81.3
	Void Ratio	2.0116	2.0080	2.0178	1.9675
	Diameter, in.	2.00	2.00	2.00	2.00
	Height, in.	1.31	1.31	1.31	1.31
Normal Stress, tsf		0.404	0.808	1.617	3.234
Fail. Stress, tsf		0.248	0.442	0.819	1.342
Strain, %		0.8	0.5	0.8	0.8
Ult. Stress, tsf		0.232	0.396	0.755	1.132
Strain, %		8.8	8.8	8.8	8.8
Strain rate, %/min.		0.80	0.80	0.80	0.80

Sample Type: Hand Compacted

Description: Ponded fly-ash, air dried to 8% and molded at 55%

Assumed Specific Gravity= 2.87

Remarks: Direct shear with smooth liner material

Client: Ameren Missouri

Project: CCP Properties, Labadie Plant

Source of Sample: Ponded Fly Ash

Sample Number: Bulk

Proj. No.: 2008012455

Date: 5/16/11



Figure _____

Tested By: J. Crose

Checked By: K. Kocher

SCHEDULE CJG-ST1
B-9

DIRECT SHEAR TEST

5/23/2011

Date: 5/16/11
Client: Ameren Missouri
Project: CCP Properties, Labadie Plant
Project No.: 2008012455
Location: Ponded Fly Ash
Sample Number: Bulk
Description: Ponded fly-ash, air dried to 8% and molded at 55%
Remarks: Direct shear with smooth liner material
Type of Sample: Hand Compacted
Assumed Specific Gravity=2.87 **LL=** **PL=** **PI=**

Parameters for Specimen No. 1

Specimen Parameter	Initial	Consolidated	Final
Moisture content: Moist soil+tare, gms.	137.620		137.620
Moisture content: Dry soil+tare, gms.	101.600		101.600
Moisture content: Tare, gms.	37.810		37.810
Moisture, %	56.5	56.5	56.5
Moist specimen weight, gms.	100.6		
Diameter, in.	2.00	2.00	
Area, in. ²	3.14	3.14	
Height, in.	1.31	1.31	
Net decrease in height, in.		0.00	
Wet Density, pcf	93.1	93.1	
Dry density, pcf	59.5	59.5	
Void ratio	2.0116	2.0116	
Saturation, %	80.6	80.6	

Test Readings for Specimen No. 1

Primary load ring constant = .1176 lbs. per input unit

Normal stress = 0.4042 tsf

Strain rate, %/min. = 0.80

Fail. Stress = 0.248 tsf at reading no. 3

Ult. Stress = 0.232 tsf at reading no. 19

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Strain %	Shear Stress tsf
0	0.0000	0.0	0.0	0.0	0.000
1	0.0050	78.0	9.2	0.3	0.210
2	0.0100	90.0	10.6	0.5	0.243
3	0.0150	92.0	10.8	0.8	0.248
4	0.0200	92.0	10.8	1.0	0.248
5	0.0250	92.0	10.8	1.3	0.248
6	0.0300	92.0	10.8	1.5	0.248
7	0.0400	90.0	10.6	2.0	0.243
8	0.0500	90.0	10.6	2.5	0.243
9	0.0600	89.0	10.5	3.0	0.240
10	0.0700	88.0	10.3	3.5	0.237
11	0.0800	87.0	10.2	4.0	0.234
12	0.0900	86.0	10.1	4.5	0.232

Test Readings for Specimen No. 1

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Strain %	Shear Stress tsf
13	0.1000	86.0	10.1	5.0	0.232
14	0.1100	85.0	10.0	5.5	0.229
15	0.1200	86.0	10.1	6.0	0.232
16	0.1300	85.0	10.0	6.5	0.229
17	0.1400	85.0	10.0	7.0	0.229
18	0.1500	86.0	10.1	7.5	0.232
19	0.1750	86.0	10.1	8.8	0.232

Parameters for Specimen No. 2

Specimen Parameter	Initial	Consolidated	Final
Moisture content: Moist soil+tare, gms.	139.440		139.440
Moisture content: Dry soil+tare, gms.	103.290		103.290
Moisture content: Tare, gms.	39.460		39.460
Moisture, %	56.6	56.6	56.6
Moist specimen weight, gms.	100.8		
Diameter, in.	2.00	2.00	
Area, in. ²	3.14	3.14	
Height, in.	1.31	1.31	
Net decrease in height, in.		0.00	
Wet Density, pcf	93.3	93.3	
Dry density, pcf	59.6	59.6	
Void ratio	2.0080	2.0080	
Saturation, %	80.9	80.9	

Test Readings for Specimen No. 2

Primary load ring constant = .1176 lbs. per input unit

Normal stress = 0.8084 tsf

Strain rate, %/min. = 0.80

Fail. Stress = 0.442 tsf at reading no. 2

Ult. Stress = 0.396 tsf at reading no. 19

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Strain %	Shear Stress tsf
0	0.0000	0.0	0.0	0.0	0.000
1	0.0050	140.0	16.5	0.3	0.377
2	0.0100	164.0	19.3	0.5	0.442
3	0.0150	157.0	18.5	0.8	0.423
4	0.0200	163.0	19.2	1.0	0.439
5	0.0250	157.0	18.5	1.3	0.423
6	0.0300	155.0	18.2	1.5	0.418
7	0.0400	153.0	18.0	2.0	0.412
8	0.0500	154.0	18.1	2.5	0.415
9	0.0600	155.0	18.2	3.0	0.418
10	0.0700	153.0	18.0	3.5	0.412
11	0.0800	152.0	17.9	4.0	0.410
12	0.0900	149.0	17.5	4.5	0.402
13	0.1000	151.0	17.8	5.0	0.407
14	0.1100	150.0	17.6	5.5	0.404
15	0.1200	150.0	17.6	6.0	0.404

Test Readings for Specimen No. 2

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Strain %	Shear Stress tsf
16	0.1300	150.0	17.6	6.5	0.404
17	0.1400	149.0	17.5	7.0	0.402
18	0.1500	146.0	17.2	7.5	0.393
19	0.1750	147.0	17.3	8.8	0.396

Parameters for Specimen No. 3

Specimen Parameter	Initial	Consolidated	Final
Moisture content: Moist soil+tare, gms.	136.700		136.700
Moisture content: Dry soil+tare, gms.	100.790		100.790
Moisture content: Tare, gms.	37.310		39.310
Moisture, %	56.6	58.4	58.4
Moist specimen weight, gms.	100.4		
Diameter, in.	2.00	2.00	
Area, in. ²	3.14	3.14	
Height, in.	1.31	1.31	
Net decrease in height, in.		0.00	
Wet Density, pcf	93.0	94.0	
Dry density, pcf	59.4	59.4	
Void ratio	2.0178	2.0178	
Saturation, %	80.5	83.1	

Test Readings for Specimen No. 3

Primary load ring constant = .1176 lbs. per input unit

Normal stress = 1.6168 tsf

Strain rate, %/min. = 0.80

Fail. Stress = 0.819 tsf at reading no. 3

Ult. Stress = 0.755 tsf at reading no. 19

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Strain %	Shear Stress tsf
0	0.0000	0.0	0.0	0.0	0.000
1	0.0050	215.0	25.3	0.3	0.579
2	0.0100	281.0	33.0	0.5	0.757
3	0.0150	304.0	35.8	0.8	0.819
4	0.0200	296.0	34.8	1.0	0.798
5	0.0250	304.0	35.8	1.3	0.819
6	0.0300	331.0	38.9	1.5	0.892
7	0.0400	335.0	39.4	2.0	0.903
8	0.0500	323.0	38.0	2.5	0.871
9	0.0600	325.0	38.2	3.0	0.876
10	0.0700	325.0	38.2	3.5	0.876
11	0.0800	309.0	36.3	4.0	0.833
12	0.0900	301.0	35.4	4.5	0.811
13	0.1000	309.0	36.3	5.0	0.833
14	0.1100	307.0	36.1	5.5	0.827
15	0.1200	300.0	35.3	6.0	0.809
16	0.1300	300.0	35.3	6.5	0.809
17	0.1400	300.0	35.3	7.0	0.809
18	0.1500	295.0	34.7	7.5	0.795

Test Readings for Specimen No. 3

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Strain %	Shear Stress tsf
19	0.1750	280.0	32.9	8.8	0.755

Parameters for Specimen No. 4

Specimen Parameter	Initial	Consolidated	Final
Moisture content: Moist soil+tare, gms.	140.880		140.880
Moisture content: Dry soil+tare, gms.	105.060		105.060
Moisture content: Tare, gms.	40.830		40.830
Moisture, %	55.8	55.8	55.8
Moist specimen weight, gms.	101.6		
Diameter, in.	2.00	2.00	
Area, in. ²	3.14	3.14	
Height, in.	1.31	1.31	
Net decrease in height, in.		0.00	
Wet Density, pcf	94.0	94.0	
Dry density, pcf	60.4	60.4	
Void ratio	1.9675	1.9675	
Saturation, %	81.3	81.3	

Test Readings for Specimen No. 4

Primary load ring constant = .1176 lbs. per input unit

Normal stress = 3.2336 tsf

Strain rate, %/min. = 0.80

Fail. Stress = 1.342 tsf at reading no. 3

Ult. Stress = 1.132 tsf at reading no. 18

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Strain %	Shear Stress tsf
0	0.0000	0.0	0.0	0.0	0.000
1	0.0050	385.0	45.3	0.3	1.038
2	0.0100	463.0	54.4	0.5	1.248
3	0.0150	498.0	58.6	0.8	1.342
4	0.0200	461.0	54.2	1.0	1.242
5	0.0300	458.0	53.9	1.5	1.234
6	0.0400	488.0	57.4	2.0	1.315
7	0.0500	465.0	54.7	2.5	1.253
8	0.0600	454.0	53.4	3.0	1.224
9	0.0700	447.0	52.6	3.5	1.205
10	0.0800	446.0	52.4	4.0	1.202
11	0.0900	441.0	51.9	4.5	1.189
12	0.1000	447.0	52.6	5.0	1.205
13	0.1100	444.0	52.2	5.5	1.197
14	0.1200	435.0	51.2	6.0	1.172
15	0.1300	435.0	51.2	6.5	1.172
16	0.1400	436.0	51.3	7.0	1.175
17	0.1500	425.0	50.0	7.5	1.145
18	0.1750	420.0	49.4	8.8	1.132

pl -

DIRECT SHEAR

job
date

Ameren Labors UNL
5/14/11

Sample Description AIR DRIED POUNDED fly ASH w/ 45%
WATER ADDED, COMPACTED = TO REDUCED proctor

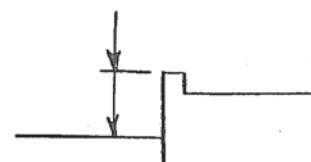
Sample + Tare Start
Sample + Tare Finish
Sample Used

4182.94
4082.38
100.56

Diam = 2.0"
Length = 1.31"

BLOCK MEASUREMENT

Projection Start
Projection Finish



Volume of Sample _____ Dry Density _____

CONFINING (Vertical) LOAD 8 Kg 0.4642 tsf

LOAD DIAL	HZ. STRAIN DIAL	VERT. STRAIN DIAL
000	0	
	5	
90	10	
92	15	
92	20	
92	25	
92	30	
90	40	
90	50	
89	60	
88	70	
87	80	
86	90	
86	100	
85	110	
86	120	
85	130	
85	140	
86	150	
86	175	

$$P = 45 \times \frac{N}{840} + \left[\frac{(N-840)}{840} \right] \times 0.353$$

P-2

DIRECT SHEAR

job
date

Ambron Labadie UWL
5/19/11

Sample Description Same As 8 Kg Sample

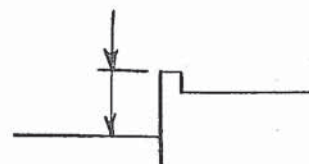
Sample + Tare Start
Sample + Tare Finish
Sample Used

4183.17
4082.38
100.79

Dia = 2.0"
L = 1.31"

BLOCK MEASUREMENT

Projection Start
Projection Finish



Volume of Sample Dry Density

CONFINING (Vertical) LOAD

14 Kg 0.8084 t/sf

$$P = 45 \times \frac{N}{840} + \left[\frac{(N-840)}{840} \times 0.353 \right]$$

LOAD DIAL	HZ. STRAIN DIAL	VERT. STRAIN DIAL
000	0	
140	5	
144	10	
157	15	
143	20	
157	25	
155	30	
153	40	
154	50	
155	60	
153	70	
152	80	
149	90	
151	100	
150	110	
150	120	
150	130	
149	140	
144	150	
147	175	

SCHEDULE CIG-ST1
B-9

DIRECT SHEAR

job Amerson Labadie UWL
 date 5/16/11

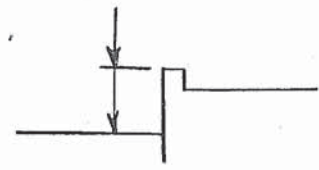
Sample Description Same As 8Kg Sample

Sample + Tare Start 4182.80
~~Sample + Tare Finish~~ 4082.38
 Sample Used 100.42

Diam = 2.0"
 L = 1.31"

BLOCK MEASUREMENT

Projection Start _____
 Projection Finish _____



Volume of Sample _____ Dry Density _____

CONFINING (Vertical) LOAD 32Kg 1.6168 tsf

$$P = 45 \times \frac{N}{840} + [(N-840) \times 0.353]$$

LOAD DIAL	HZ. STRAIN DIAL	VERT. STRAIN DIAL
000	0	
215	5	
281	10	
304	15	
296	20	
304	25	
331	30	
335	40	
323	50	
325	60	
325	70	
309	80	
301	90	
309	100	
307	110	
300	120	
300	130	
300	140	
295	150	
280	175	

Ref

DIRECT SHEAR

job Ameren Labadie WWL
date 5/16/11

Sample Description Same as 8 Kg Sample

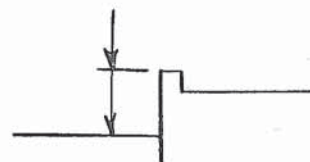
Sample + Tare Start
~~Sample + Tare Finish~~
Sample Used

4183.98
4082.38
101.60

DIA = 2.0"
L = 1.31"

BLOCK MEASUREMENT

Projection Start _____
Projection Finish _____



Volume of Sample _____ Dry Density _____

CONFINING (Vertical) LOAD 64 Kg 3.2336 tsf

$$P = 45 \times \frac{N}{840} + \left[\frac{(N-840)}{840} \times 0.353 \right]$$

LOAD DIAL	HZ. STRAIN DIAL	VERT. STRAIN DIAL
000	0	
385	5	
463	10	
498	15	
461	20	
	25	
458	30	
488	40	
465	50	
454	60	
447	70	
446	80	
441	90	
447	100	
444	110	
435	120	
435	130	
436	140	
425	150	
420	175	

ATTERBERG LIMITS & MOISTURE CONTENT

Job: Direct Shear Date: 5/16/11
 Location: Labadie Powder Fly Ash Test By: JRW + JLC
Air Dry @ 45% added Checked: VER Date: 5/17/11
on smooth liner

Test Hole	8kg	16kg			
Depth					
Type of Test					
Container No.	R55	R11			
No. of Blows					
Wt. Wet + Tare	137.62	139.44			
Wt. Dry + Tare	101.60	103.29			
Wt. Water					
Tare	37.81	39.46			
Wt. Dry Soil					
% Moisture	56.5	56.6			
Liquid Limit					
Average Limits					

Test Hole	32kg	64kg			
Depth					
Type of Test					
Container No.	R33	13			
No. of Blows					
Wt. Wet + Tare	136.70	140.88			
Wt. Dry + Tare	100.79	105.06			
Wt. Water					
Tare	37.31	40.83			
Wt. Dry Soil					
% Moisture	56.6	55.8			
Liquid Limit					
Average Limits					

Test Hole					
Depth					
Type of Test					
Container No.					
No. of Blows					
Wt. Wet + Tare					
Wt. Dry + Tare					
Wt. Water					
Tare					
Wt. Dry Soil					
% Moisture					
Liquid Limit					
Average Limits					

Remarks: _____

Ameren Missouri; Labadie Power Plant UWL

Utility Waste Landfill, CCP Properties

Material: 100% ponded fly ash, material was air dried to 8% moisture then molded at 55% moisture

Hydraulic Conductivity

Soil Conditions	
Pre-test conditions	Post-test Conditions
Wet Density = 90.4 (lbs/ft ³)	Wet Density = 99.6 (lbs/ft ³)
% Moisture = 52.6%	% Moisture = 65.9%
Dry Density = 59.2 (lbs/ft ³)	Dry Density = 60.1 (lbs/ft ³)

Test Information	
a (cm ²)=	0.1969
L (cm)=	4.8138
A (cm ²)=	19.3625

Trial 1													
Date and Time	Elapsed Time (seconds)	Cell Burette Reading (ml)	Base Burette		Top Burette		Total Head Across Sample (cm of water)	Temperature (°C)	Weighted Average Temp. (°C)	Uncorrected Hydraulic Conductivity (cm/sec)	Correction Factor	Cumulative Time (sec)	Corrected Hydraulic Conductivity (cm/sec)
			Reading (ml)	Distance from Datum (cm)	Reading (ml)	Distance from Datum (cm)							
3/20/11 10:05	0	9.2	10.00	27.200	0.00	78.000	85.979	21.4					
3/20/11 10:06	60	9.2	9.05	32.026	0.97	73.072	76.225	21.4	21.40	4.91E-05	0.9669876	60	4.75E-05
3/20/11 10:07	120	9.2	8.24	36.141	1.75	69.110	68.148	21.4	21.40	4.74E-05	0.9669876	120	4.58E-05
3/20/11 10:09	240	9.2	6.84	43.253	3.13	62.100	54.026	21.4	21.40	4.74E-05	0.9669876	240	4.58E-05
3/20/11 10:13	480	9.2	4.88	53.210	5.12	51.990	33.960	21.4	21.40	4.74E-05	0.9669876	480	4.58E-05
3/20/11 10:20	900	9.2	3.04	62.557	6.94	42.745	15.367	21.4	21.40	4.68E-05	0.9669876	900	4.53E-05
3/20/11 10:35	1800	9.2	1.85	68.602	8.13	36.700	3.277	21.4	21.40	4.44E-05	0.9669876	1800	4.30E-05
H.C.=												4.5E-05	

Hydraulic Conductivity (ASTM-D 5084) Flow Rate Calculation

Job-~~-----~~ Amazon Labadie UWL

Location-

Sample--- 100% Bonded Ash, Air dried to 8% then

Depth-----

$$a = 0.1969$$
$$A = 19.3625$$
$$L = 4.8138$$

Cell No. 3

Cell Pressure (p.s.i.)	Base Pressure (p.s.i.)	Top Pressure (p.s.i.)
------------------------------	------------------------------	-----------------------------

(p.s.1.)	(p.s.2.)	(p.s.3.)
66,5	65,0	65,5

[illegible]

TRIAXIAL CELL SETUP & TAKEDOWN

Project American Labadie UWL Date 4-11-2011

Sample Labadie Ponded Fly Ash Depth _____

Description 100% Labadie Ponded Ash Air dried to ~8%, then molded at 65% M

Type of Test HC Confining Pressure Differential _____

Cell Number 3 Saturate before after Consolidation _____

Number of Membranes 2 Filter Strips Yes No

MOISTURE CONTENT			
	INITIAL		FINAL
Tare No.	<u>36</u>	<u>2</u>	<u>Bowl 1</u>
Wet Wt. + Tare	<u>129.30</u>	<u>107.23</u>	<u>343.78</u>
Dry Wt. + Tare	<u>94.03</u>	<u>84.19</u>	<u>284.71</u>
Wt. Water			
Tare Wt.	<u>41.34</u>	<u>40.52</u>	<u>195.03</u>
Dry Soil Wt.			<u>89.68</u>
Moisture %	<u>52.470</u>	<u>52.759</u>	<u>65.868</u>
Avg. w %	<u>52.6</u>		<u>65.9</u>

LENGTH CHANGE	
STRAIN GAUGE at setup	<u>N/A</u>
at saturation start	<u>↓</u>
at consolidation start	<u>↓</u>
at axial load start	<u>↓</u>

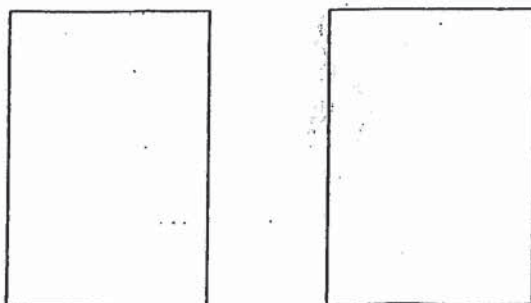
SPECIMEN DIMENSIONS in. / mm.				
HEIGHT			DIAMETER	
	Initial	Final	Initial	Final
1	<u>1.9060</u>	<u>1.8925</u>	T <u>1.9600</u>	<u>1.9655</u>
2	<u>1.9140</u>	<u>1.8940</u>	M <u>1.9680</u>	<u>1.9540</u>
3	<u>1.9045</u>	<u>1.8990</u>	B <u>1.9700</u>	<u>1.9450</u>
Avg.	<u>1.9082</u>	<u>1.8952</u>	<u>1.9660</u>	<u>1.9548</u>

MASS PROPERTIES		
Wt. Tube + Soil		gm.
Wt. Tube		gm.
Wt. Soil	<u>137.09</u>	gm.
Tube Diameter		in.
Sample Length		in.
tube length		in.
top trim		in.
bottom trim		in.
total trim		in.
sample length		in.
Density constant		
$4.85/(D^2 * L)$		
Wet Density		pcf.
Dry Density		pcf.

Description After Test Initial $\gamma_m = 90.4$ Final $\gamma_m = 99.6$
 $\gamma_m = 52.6$ $\gamma_m = 65.9$
 $\gamma_p = 59.2$ $\gamma_p = 60.1$

Remarks _____

Failure Sketch



Trimmed By KEK
Trimmed Date 4-11-11

Setup By KEK
Setup Date 4-11-11

Taken Down By KEK
Take Down Date 4-11-11

SCHEDULE C/JG-STP

TRIAXIAL CELL SATURATION & BETA FACTOR

PROJECT Amara Lohdiz Uu

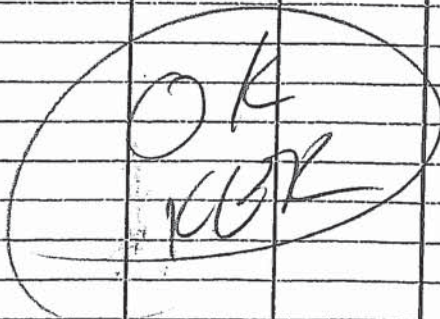
SAMPLE Powdered Fly Ash DEPTH _____

INITIAL CELL PRESSURE 51.0 START DATE 4-11-11

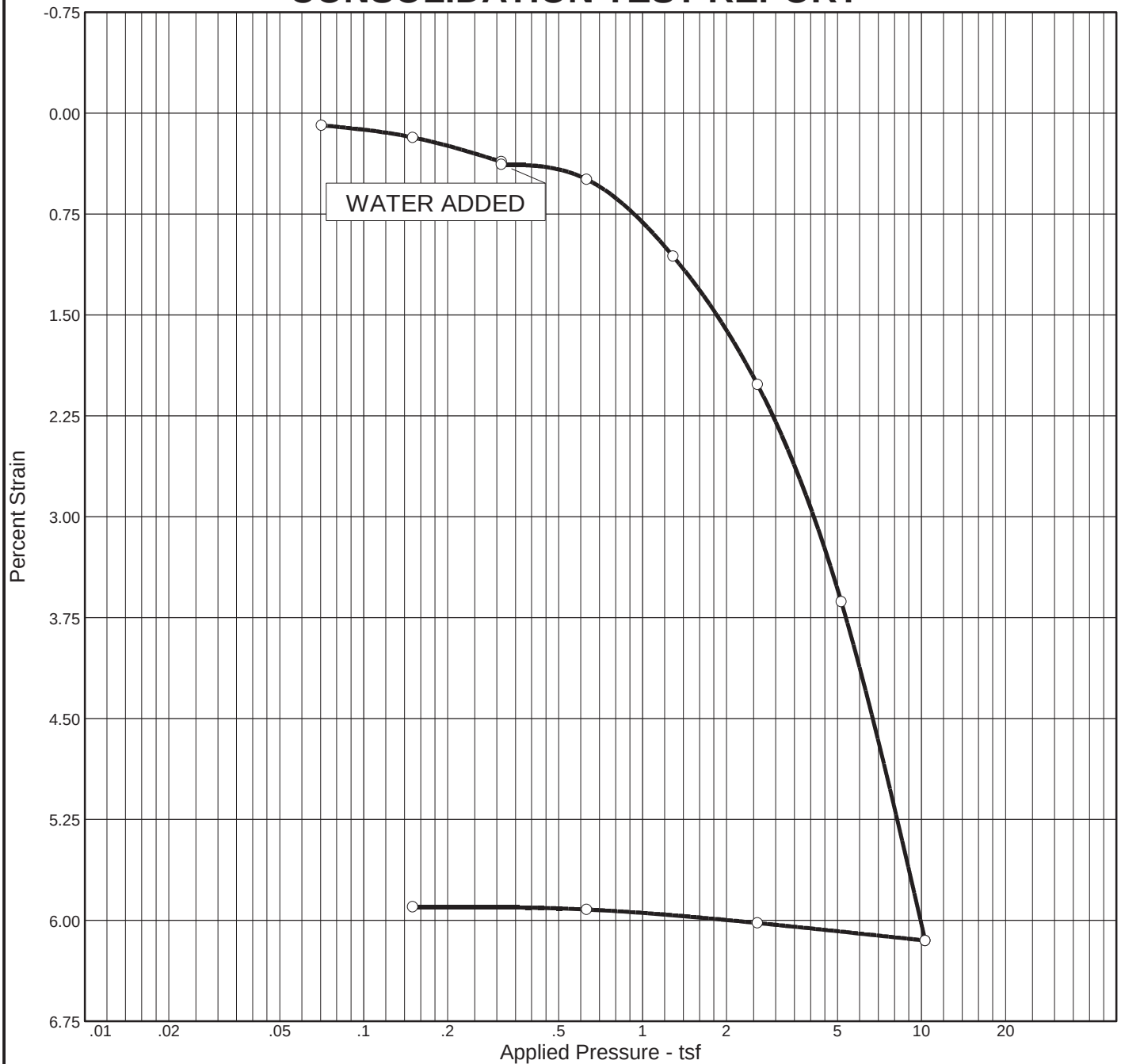
INITIAL PORE PRESSURE 50.0 CELL NUMBER 3

INITIAL TRANSDUCER READING 50.5 TRANSDUCER NUMBER 3

TRIAL DATE	TRIAL TIME	BASE BURETTE READING	CELL PRESSURE	TRANS- DUCER READING	CHANGE IN PRESSURE			
					Transducer Constant _____			BETA FACTOR (2/1)
					CELL DELTA (1)	TRANSDUCER		
						READING CHANGE	PRESSURE CHANGE (2)	
4-13-11	0	2.11	51.0	50.5				
	1		56.0	54.9	5.0		4.4	0.88
	2		"	54.8	5.0		4.3	0.86
	4		"	54.8	5.0		4.3	0.86
4-15-11	0	2.62	56.0	55.5				
	1		61.0	60.2	5.0		4.7	0.94
	2		"	60.2	5.0		4.7	0.94
	4		"	60.2	5.0		4.7	0.94
	8		"	60.2	5.0		4.7	0.94
4-20-11	0	2.97	61.0	60.4				
	1		66.0	65.2	5.0		4.8	0.96
	2		"	65.2	5.0		4.8	0.96
	4		"	65.2	5.0		4.8	0.96
	8		"	65.2	5.0		4.8	0.96
			"		5.0			



CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P _c (tsf)	C _c	C _s	Swell Press. (tsf)	Swell %	e ₀
Sat.	Moist.											
82.7 %	56.1 %	60.8			2.87		2.46	0.25	0.00			1.946

MATERIAL DESCRIPTION	USCS	AASHTO
Ponded fly-ash, air dried to 8% and molded at 55%		

Project No. 2008012455 Client: Ameren Missouri Project: CCP Properties, Labadie Plant Source: Ponded Fly Ash Sample No.: Bulk	Remarks:
 REITZ & JENS, INC. CONSULTING ENGINEERS	

Figure

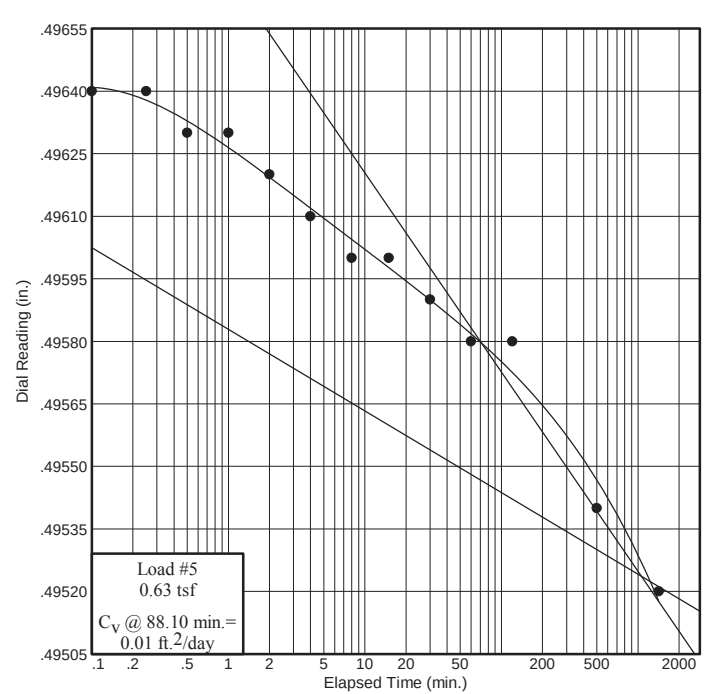
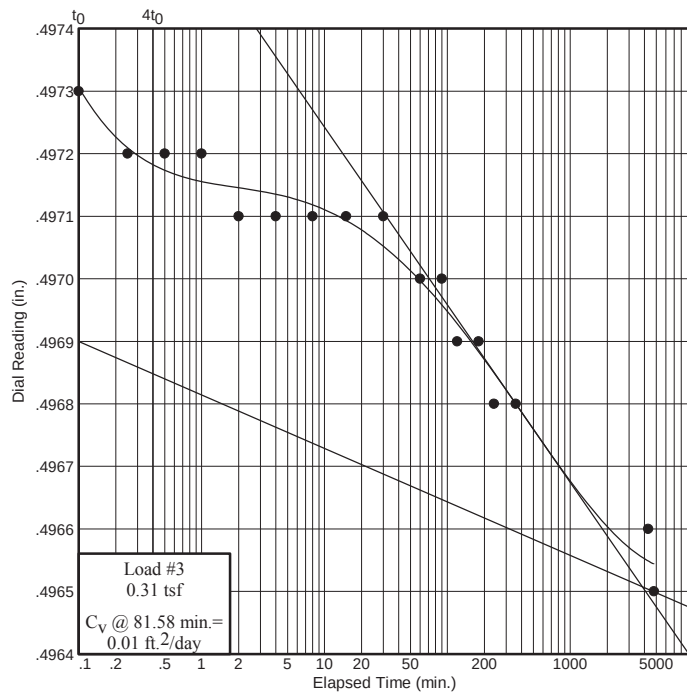
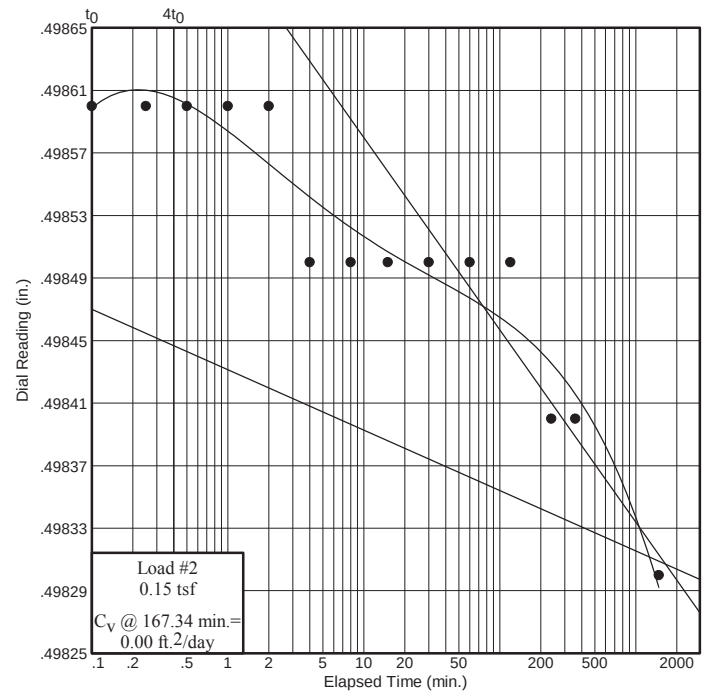
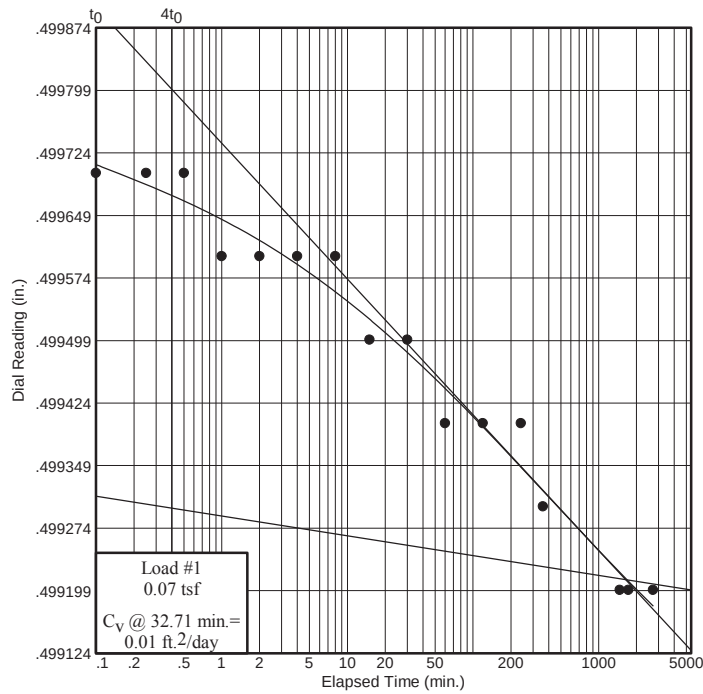
Dial Reading vs. Time

Project No.: 2008012455

Project: CCP Properties, Labadie Plant

Source: Ponded Fly Ash

Sample No.: Bulk



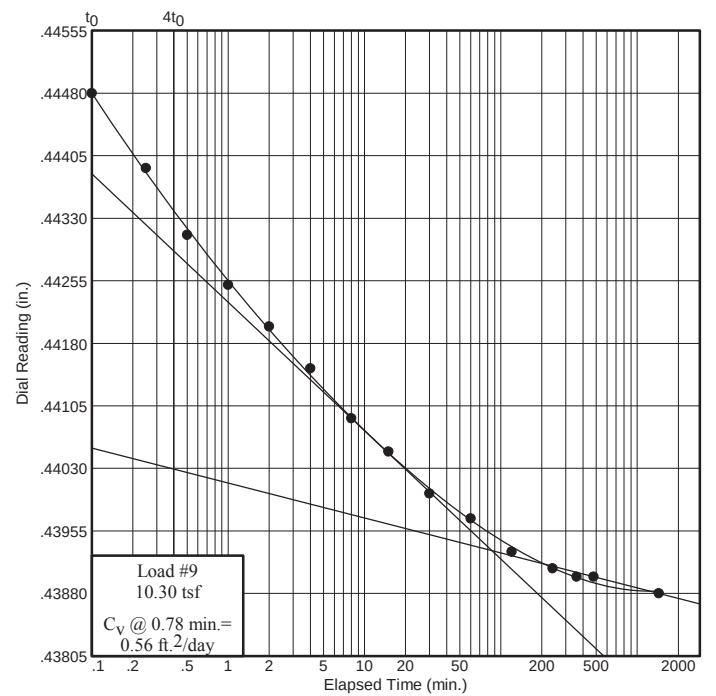
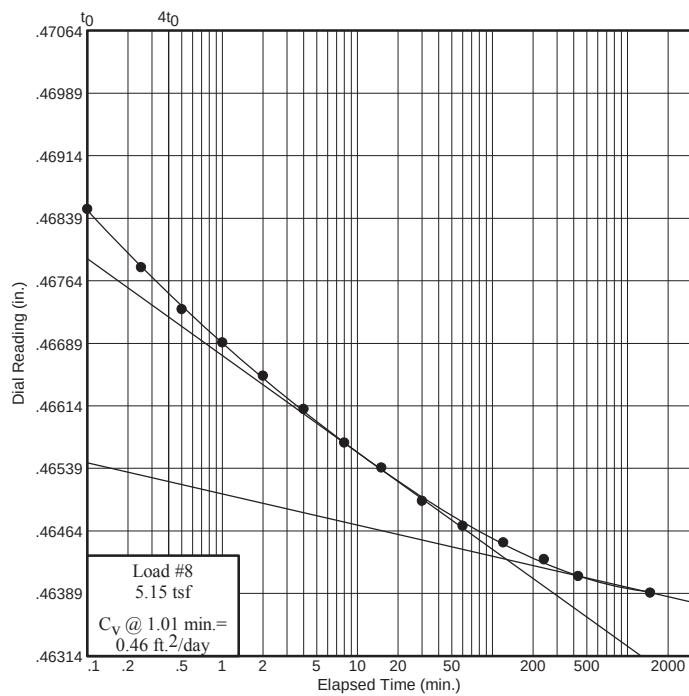
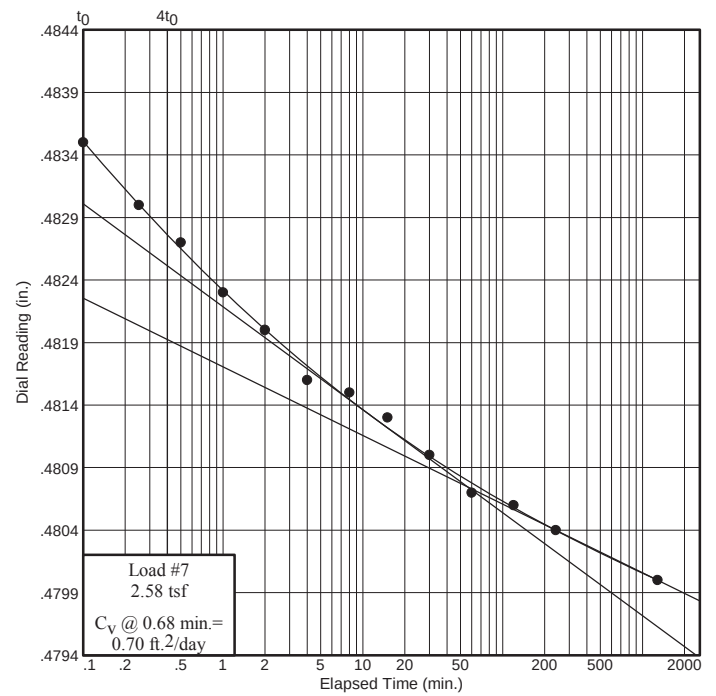
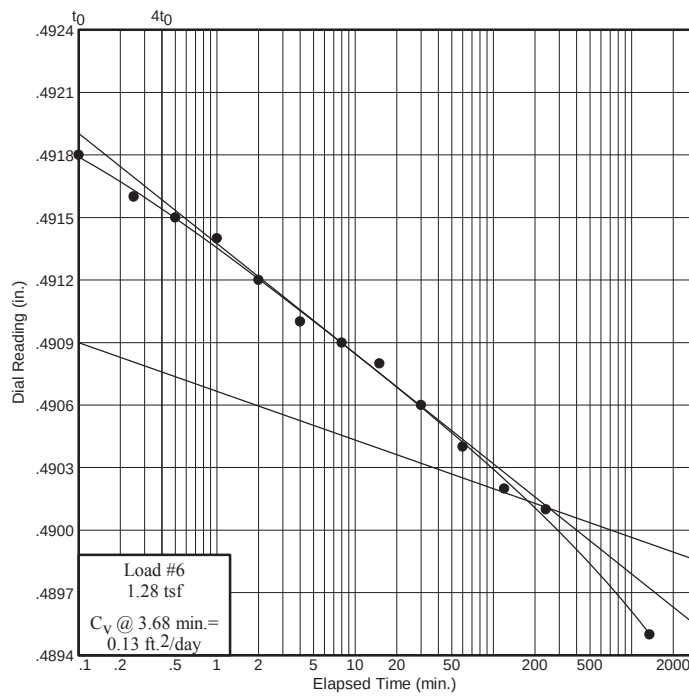
Dial Reading vs. Time

Project No.: 2008012455

Project: CCP Properties, Labadie Plant

Source: Ponded Fly Ash

Sample No.: Bulk



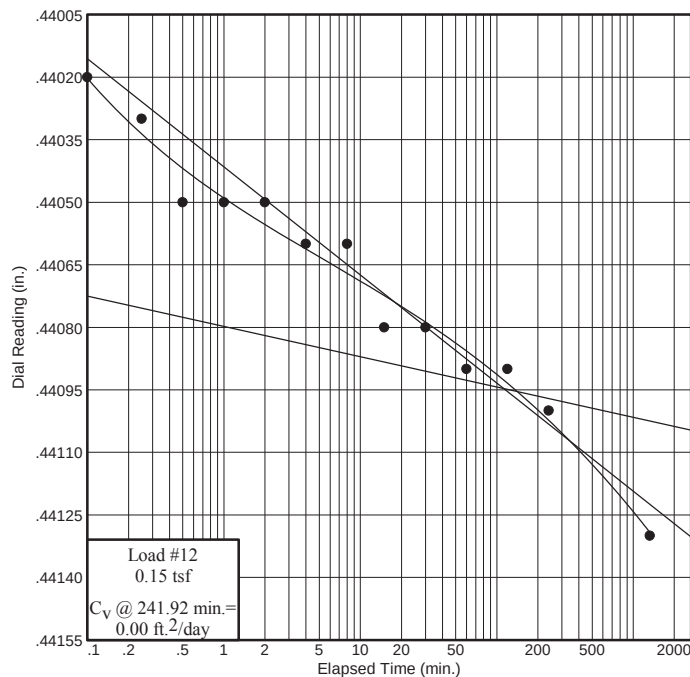
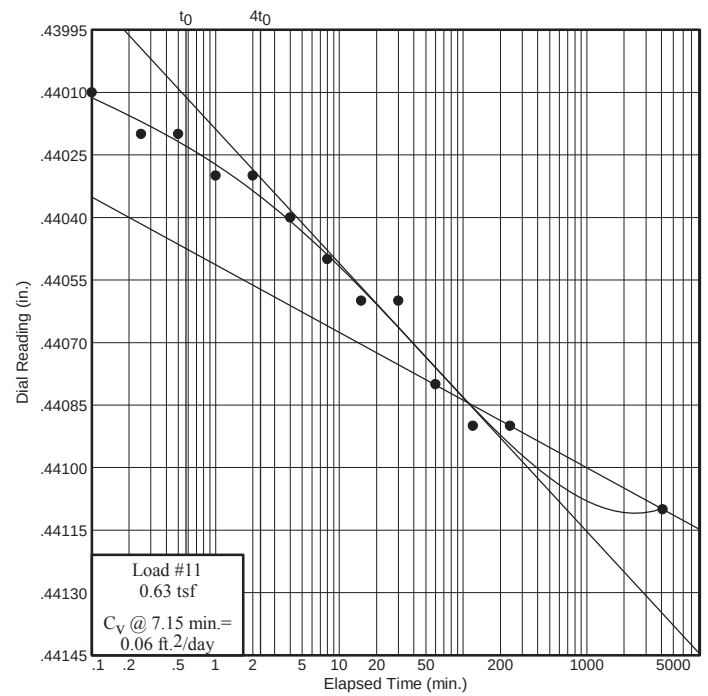
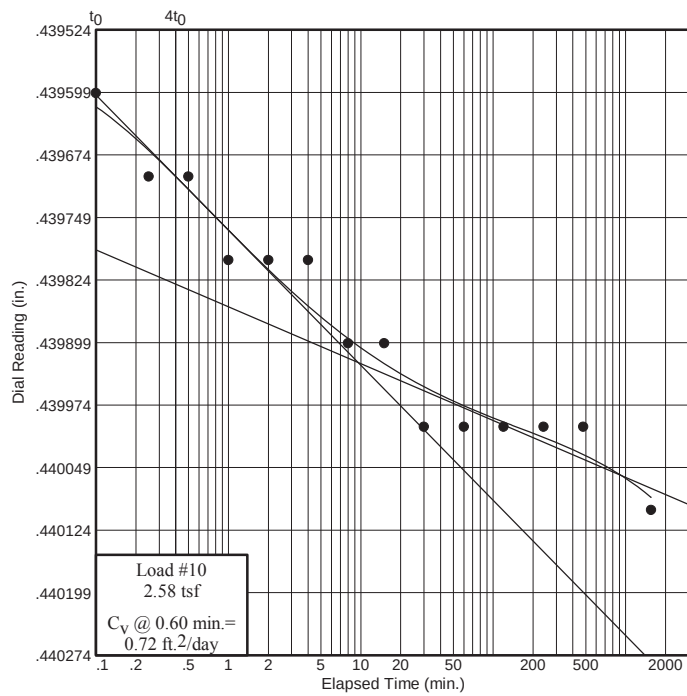
Dial Reading vs. Time

Project No.: 2008012455

Project: CCP Properties, Labadie Plant

Source: Pondered Fly Ash

Sample No.: Bulk



CONSOLIDATION TEST DATA

Client: Ameren Missouri
Project: CCP Properties, Labadie Plant
Project Number: 2008012455

Sample Data

Source: Ponded Fly Ash
Sample No.: Bulk
Elev. or Depth: **Sample Length(in./cm.):**
Location:
Description: Ponded fly-ash, air dried to 8% and molded at 55%
Liquid Limit: **Plasticity Index:**
USCS: **AASHTO:** **Figure No.:**
Testing Remarks:

Test Specimen Data

TOTAL SAMPLE	BEFORE TEST	AFTER TEST
Wet w+t = 259.37 g.	Consolidometer # = 1	Wet w+t =
Dry w+t = 180.45 g.		Dry w+t =
Tare Wt. = 39.71 g.	Spec. Gravity = 2.87	Tare Wt. =
Height = 1.00 in.	Height = 1.00 in.	
Diameter = 2.50 in.	Diameter = 2.52 in.	
Weight = 121.70 g.	Defl. Table = Labadie 100% Fly Ash at 65%M	
Moisture = 56.1 %	Ht. Solids = 0.3383 in.	Moisture = %
Wet Den. = 94.9 pc/f	Dry Wt. = 79.04 g.*	Dry Wt. = n/a
Dry Den. = 60.8 pc/f	Void Ratio = 1.946	Void Ratio = 1.772
	Saturation = 82.7 %	

* Initial dry weight used in calculations

End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C _v (ft. ² /day)	C _α	Void Ratio	% Compression /Swell
start	0.50010				1.946	
0.07	0.49880	0.00040	0.01	0.000	1.943	0.1 Compr.
0.15	0.49720	0.00110	0.00	0.000	1.941	0.2 Compr.
0.31	0.49450	0.00200	0.01	0.000	1.935	0.4 Compr.
water	0.49430	0.00200			1.935	0.4 Compr.
0.63	0.49200	0.00320	0.01	0.000	1.931	0.5 Compr.
1.28	0.48410	0.00540	0.13	0.000	1.915	1.1 Compr.
2.58	0.47290	0.00710	0.70	0.001	1.887	2.0 Compr.
5.15	0.45440	0.00950	0.46	0.000	1.839	3.6 Compr.
10.30	0.42670	0.01210	0.56	0.000	1.765	6.2 Compr.
2.58	0.43030	0.00980	0.72		1.769	6.0 Compr.
0.63	0.43350	0.00760	0.06		1.772	5.9 Compr.
0.15	0.43540	0.00590	0.00		1.772	5.9 Compr.

C_c = 0.25 P_c = 2.46 tsf C_s = 0.00
Collapse percentage = 0.0

CONSOLIDATION TEST

Rev. 4/2000

† - to be completed by Project Engineer

Date 4-11-11 Set-up by KEK
Sample Description: 100% Labadie Panned Ash
Ash Air dried to ~8%, then molded
At 55% Moisture

†Project Number _____

†Job Amizren Labadie UWL

†Test Hole _____

†Sample Labadie Panned Ash †Depth _____

†Sample Type Molded

†S.G.=2.87 ☒ Measured ☐ Assumed

L.L.= _____ PP= _____ TSF

P.L.= _____ Torvane= _____ TSF

USCS: _____ AASHTO: _____

†Testing Remarks: _____

Test Specific Data

†Deflection Table: _____

Rig No. 1 Ring I

†Overburden Pressure= _____ kg/cm²

☐ Check if sample is to be undercut.

Sample Undercut= None inch

Sample Height at Test Start= 0.9966 inch

Untrimmed Sample Data

Wgt. Tube+ Soil= _____ g

Wgt. Tube= _____ g

Wgt. Soil= _____ g

Sample Lgth. (L)= _____ in.

Sample Dia. (D)= _____ in.

Tube Constant (k)= _____

k= 4.85/(D²L)

Wet Unit Wgt.= _____ PCF

Initial Moisture Content

Tare No.: 3

Wet Wgt.+Tare= 259.37 g

Dry Wgt.+Tare= 180.45 g

Wgt. Water= 78.92 g

Wgt. Tare= 39.71 g

Wgt. Dry Soil= 140.74 g

Water Content= 56.07 %

Dry Unit Wgt.= 90.18 PCF

Initial Trimmed Sample Data

Trimmed sample in ring without dish.

Wgt. Ring= 499.18 g

Wet Wgt.+Ring= 620.91 g

Wgt. Wet Soil= 121.7 g

Seating Load of 0.125 Kg
Hanger Load

†Sequence †Instructions

0.25 kg 0.0705 TSF

0.5 kg 0.1495 TSF

1.0 kg 0.3116 TSF

1.0 kg Add Water

2.0 kg 0.6290

4.0 kg 1.2844

8.0 kg 2.5777

16.0 kg 5.1524

32.0 kg 10.3004

8.0 kg 2.5777

2.0 kg 0.6290

0.5 kg 0.1499

_____ kg _____

_____ kg _____

_____ kg _____

_____ kg _____

_____ kg _____

_____ kg _____

_____ kg _____

_____ kg _____

† Run Mach. Deflections

Reading Difference

.5996 0.0004 in.

.5989 0.0011 in.

.5986 0.0020 in.

.5977 0.0023 in.

.5968 0.0032 in.

.5946 0.0054 in.

.5929 0.0071 in.

.5905 0.0095 in.

.5879 0.0121 in.

.5902 0.0098 in.

.5924 0.0076 in.

.5941 0.0059 in.

_____ in.

_____ in.

_____ in.

_____ in.

_____ in.

_____ in.

_____ in.

_____ in.

Post-Test Sample Data

Dish No.: 3A

Wgt. Dish= 197.03 g

Tare (Ring+Dish)= 696.21 g

Wet Wgt.+Tare= 815.67 g

Dry Wgt.+Tare= 772.56 g

Wgt. Water= _____ g

Wgt. Dry Soil= _____ g

Water Content= _____ %

Squeezings ☒ Check if none.

Tare No.: _____

Dry Wgt.+Tare= _____ g

Wgt. Tare= _____ g

Wgt. Dry Squeezings= _____ g

_____ g

_____ g

_____ g

_____ g

_____ g

_____ g

_____ g

_____ g

SCHEDULE CJG-ST1

B-11

START DEFLEX = .6000

REITZ & JENS, INC.

CONSOLIDATION TEST-TIME SHEET

Consulting Engineers

R&J Project: Ameron Labadie NWLSheet 1 of 5Boring: 100% FOUNDED
15HSample: 55% MDepth: N/ARig: 1

DATE	LOAD kg	TESTER'S INITIALS	TIME	ELAPSED TIME, min.	DIAL READING	NOTES
4/12	0.25	JJC	10:15	0	.5001	SEATED 4/11 w/.125 kg
				.1	.4993	
				.25	.4993	
				.5	.4993	
			16	1	.4992	
			17	2	.4992	
			19	4	.4992	
			23	8	.4992	
			30	15	.4991	
			45	30	.4991	
			11:15	60	.4990	
			12:15	120	.4990	
			14:15	240	.4990	
			16:15	360	.4989	
4-13-11		KCK	10:50	1475	.4988	
"		"	15:00	1725	.4988	
4-14-11		"	7:30	2715	.4988	
	0.50 kg	"	7:30	0	.4988	
				.1	.4975	
				.25	.4975	
				.5	.4975	
			7:31	1	.4975	
			7:32	2	.4975	
			7:34	4	.4974	
			7:38	8	.4974	
			7:45	15	.4974	
			8:00	30	.4974	
			8:30	60	.4974	
			9:30	120	.4974	
			11:30	240	.4973	
			13:30	360	.4973	
4-15-11			8:10	1480	.4972	
	1.0 kg	KCK	8:10	0	.4972	
				.1	.4953	
				.25	.4952	
				.5	.4952	
			8:11	1	.4952	
			8:12	2	.4951	
			8:14	4	.4951	
			8:18	8	.4951	
			8:25	15	.4951	

REITZ & JENS, INC.

CONSOLIDATION TEST-TIME SHEET

Consulting Engineers

R&J Project: Amesbury Labadize UWLSheet 2 of 5Boring: 100% Pounded PSHSample: 552MDepth: N/ARig: 1

DATE	LOAD kg	TESTER'S INITIALS	TIME	ELAPSED TIME, min.	DIAL READING	NOTES
4-15-11	1.0	KEK	8:40	30	.4951	
			9:10	60	.4950	
			9:40	90	.4950	
			10:10	120	.4949	
			11:10	180	.4949	
			12:10	240	.4948	
			14:10	360	.4948	
4-18-11		KEK	8:00	4310	.4946	
			4:10 pm	4800	.4945	
4-19-11	1.0	JJC	10:35	0	.4945	ADD H ₂ O
				.1	43	
				.25	43	
				.5	43	
			36	1	44	
			37	2	43	
			39	4	43	
			43	8	43	
			50	15	43	
			11:05	30	43	
			11:35	60	42	
4/20	1.0	JJC	08:35	0	.4943	
	2.0			.1	.4932	
				.25	32	
				.5	31	
			36	1	31	
			37	2	30	
			39	4	29	
			43	8	28	
			50	15	28	
			09:05	30	27	
			09:35	60	26	
			10:35	120	26	
			12:35	240		
		KEK	16:55	500	.4922	
4-21-11		KEK	8:15	1420	.4920	
4/22/11		JJC	10:30	0	.4919	
	4Kg		10:35	.1	.4864	
				.25	62	
				.5	61	
			36	1	60	
			37	2	58	
			39	4	58	

REITZ & JENS, INC.

CONSOLIDATION TEST-TIME SHEET

Consulting Engineers

R&J Project: Ameren LABADIE UWL Sheet 3 of 5Boring: 100% pond Sample: 557cm Depth: N/A Rig: 1
ASH

DATE	LOAD kg	TESTER'S INITIALS	TIME	ELAPSED TIME, min.	DIAL READING	NOTES
4/22	4Kg	JSC	1043	8	.4855	
			1050	15	.4854	
			1105	30	.4852	
			1135	40	.4850	
		(cwl)	1235	120	.4848	
			1435	240	.4847	
4-25	4	JSC	8:55	1345 10	.4841	
"	8	JSC	1020	.1	.4764	
				.25	.4759	
				.5	.4756	
			21	1	.4752	
			22	2	.4749	
			24	4	.4745	
			28	8	.4744	
			35	15	.4742	
			50	30	.4739	
			1120	60	.4736	
			1220	120	.4735	
			1420	240	.4733	
4/26	8	JSC	0805	1285 10	4729	
	16		0820	.1	4590	
				.25	4583	
				.5	4578	
			21	1	.4574	
			22	2	.4570	
			24	4	.4566	
			28	8	.4562	
			35	15	.4559	
			50	30	.4555	
			0920	60	.4552	
			1020	120	.4550	
			1220	240	.4548	
			1530	430	.4546	
			1620	480	.4546	
4/27	16	JSC	0840	485 10	.4544	
	32			.1	.4327	
				.25	.4318	
				.5	.4310	
			41	1	.4304	
			42	2	.4299	
			44	4	.4294	
			48	8	.4288	

REITZ & JENS, INC.

CONSOLIDATION TEST-TIME SHEET

Consulting Engineers

R&J Project: AMEREN LABADIE UWLSheet 4 of 5Boring: 100% 154 Sample: 55% M Depth: N/ARig: 1

DATE	LOAD kg	TESTER'S INITIALS	TIME	ELAPSED TIME, min.	DIAL READING	NOTES
4/27	32	JAL	0855	15	.4284	
			0910	30	.4279	
			0940	60	.4276	
			1040	120	.4272	
			1240	240	.4270	
			1440	360	.4269	
			1640	480	.4269	
4/28	32	JAL	0840	1440	.4267	
	8		0850	.1	.4258	
				.25	.4299	
				.5	.4299	
			51	1	.4300	
			52	2	.4300	
			54	4	.4300	
			58	8	.4301	
			0905	15	.4301	
			0920	30	.4302	
			0950	60	.4302	
			1050	120	.4302	
		KEK	1250	240	.4302	
		JAL	1650	480	.4302	
4/29	8		1050	1560.10	.4303	
	2		1100	.1	.4325	
				.25	.4326	
				.5	.4326	
			01	1	.4327	
			02	2	.4327	
			04	4	.4328	
			08	8	.4329	
			15	15	.4330	
			30	30	.4330	
			1200	60	.4332	
			1300	120	.4333	
			1500	240	.4333	
5-2-11	2	KEK	8:30	4090	.4335	
	0.5	JAL	0950	.1	.4343	
				.25	.4344	
				.5	.4346	
			51	1	.4346	
			52	2	.4346	
			54	4	.4347	
			58	8	.4347	

$$\begin{array}{r} 1440 \\ - 115 \\ \hline 1325 \end{array}$$
$$\begin{array}{r} 1440 \\ - 115 \\ \hline 1325 \end{array}$$
$$\begin{array}{r} 1440 \\ - 115 \\ \hline 1325 \end{array}$$
$$\begin{array}{r} 1440 \\ - 115 \\ \hline 1325 \end{array}$$
$$\begin{array}{r} 1440 \\ - 115 \\ \hline 1325 \end{array}$$
$$\begin{array}{r} 1440 \\ - 115 \\ \hline 1325 \end{array}$$
$$\begin{array}{r} 1440 \\ - 115 \\ \hline 1325 \end{array}$$
$$\begin{array}{r} 1440 \\ - 115 \\ \hline 1325 \end{array}$$

SPECIFIC GRAVITY OF SOLIDS

Pycnometer Method

JOB: Ameren; Labadie CCP Testing

DATE: 8/13/10

BORING: Labadie Bottom Ash

TEST BY: J. David

SAMPLE: Bulk

COMPUTED BY: K: Kocher

Sample or Specimen No.		1	2	
Flask No.		8	8	
Temperature of water and soil, T, °C		22.5	22.5	
Dish No.				
Weight in Grams	Dish + Dry Soil			
	Dish			
	Dry soil	W_s	100.11	100.11
	Flask + water at T, °C	W_{bw}	678.23	678.21
	$W_s + W_{bw}$		778.34	778.32
	Flask + water + immersed soil	W_{bws}	742.64	742.64
	Displaced water, $W_s + W_{bw} - W_{bws}$		35.70	35.68
Correction factor		K	.99945	.99945
$(W_s K) / (W_s + W_{bw} - W_{bws})$		G_s	2.80	2.80

Sample Description

#1 Bottom ash, tan and grey, fine sand to coarse gravel size particles, pitted

#2 Same

Flask Calibration	Trial				
Weight					
Temp.					

SPECIFIC GRAVITY OF SOLIDS

Pycnometer Method

JOB: Ameren UE CCP Ash Study DATE: 8/13/10
 BORING: Labadie TEST BY: [Signature]
 SAMPLE: Bottom Ash COMPUTED BY: JKP & LOK

Sample or Specimen No.		—		
Flask No.		8		8
Temperature of water and soil, T, °C		22.5		22.5
Dish No.		—		
Weight in Grams	Dish + Dry Soil			
	Dish			
	Dry soil	W_s	100.11	100.11
	Flask + water at T, °C	W_{bw}	678.23	678.21
	$W_s + W_{bw}$		778.34	778.32
	Flask + water + immersed soil	W_{bws}	742.64	742.64
	Displaced water, $W_s + W_{bw} - W_{bws}$		35.70	35.68
Correction factor		K	.9945	.9945
$(W_s K) / (W_s + W_{bw} - W_{bws})$		G_s	2.802	2.804

$$100.0549 / 35.70 = 2.8027$$

2010 flask data

Av. flask data
2.804

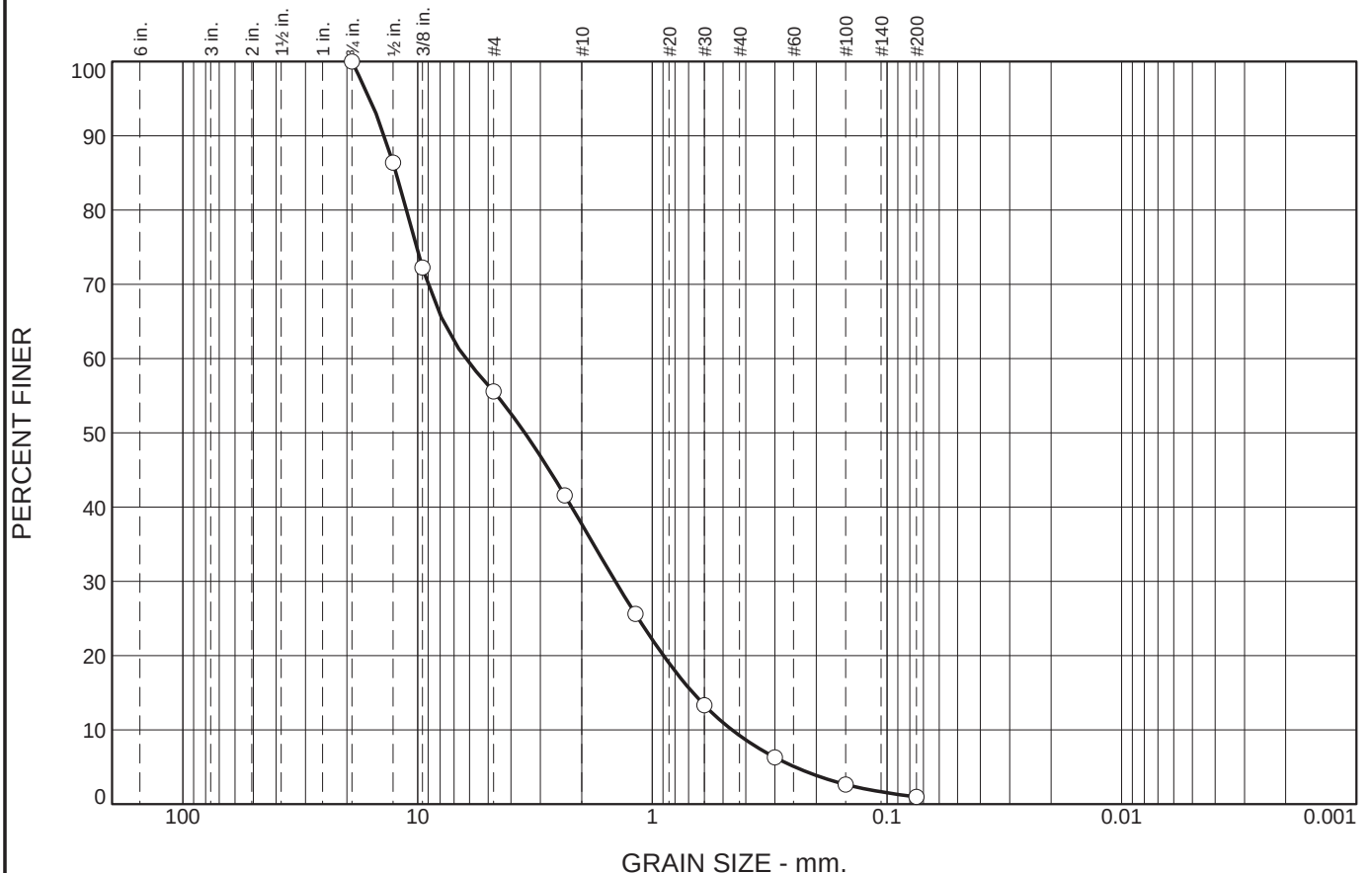
Sample Description

#1 Flask #8 179.98 g.
material passing #4 per ASTM

#2 Tan & Grey fine sand to coarse
gravel size, pitted

Flask Calibration	Trial				
Weight					
Temp.					

Particle Size Distribution Report - ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	44.4	17.8	28.6	8.2	1.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
1/2	86.4		
3/8	72.3		
#4	55.6		
#8	41.6		
#16	25.6		
#30	13.3		
#50	6.3		
#100	2.6		
#200	1.0		

* (no specification provided)

Material Description

Bottom Ash, grey and tan, fine sand to coarse gravel size particles, pitted, from pond

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS= AASHTO=

Coefficients

D₈₅= 12.3294 D₆₀= 6.2300 D₅₀= 3.4902
D₃₀= 1.4347 D₁₅= 0.6720 D₁₀= 0.4577
C_u= 13.61 C_c= 0.72

Date Tested: 12/17/09 Tested By: M. Tierney

Remarks

Sample No.: Bulk Source of Sample: Bottom Ash

Date Sampled: 12/17/09

Location:

Elev./Depth:

Checked By: K. Kocher

Title: Engineer



REITZ & JENS, INC.
CONSULTING ENGINEERS

Client: Ameren Missouri

Project: CCP Properties, Labadie Plant

Project No: 2008012455

Figure

SCHEDULE CJG-ST1
B-13

GRAIN SIZE DISTRIBUTION TEST DATA

5/24/2011

Client: Ameren Missouri

Project: CCP Properties, Labadie Plant

Project Number: 2008012455

Location: Bottom Ash

Sample Number: Bulk

Material Description: Bottom Ash, grey and tan, fine sand to coarse gravel size particles, pitted, from pond

Sample Date: 12/17/09

Tested By: M. Tierney

Test Date: 12/17/09

Checked By: K. Kocher

Title: Engineer

Sieve Test Data

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 1524.36

Tare Wt. = 505.91

Minus #200 from wash = 0.6%

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
1530.79	505.91	0.00	3/4	0.00	100.0
			1/2	139.63	86.4
			3/8	284.25	72.3
			#4	455.21	55.6
			#8	598.54	41.6
			#16	762.30	25.6
			#30	888.37	13.3
			#50	960.17	6.3
			#100	997.77	2.6
			#200	1014.72	1.0

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	44.4	44.4	17.8	28.6	8.2	54.6			1.0

D ₁₀	D ₁₅	D ₂₀	D ₃₀	D ₅₀	D ₆₀	D ₈₀	D ₈₅	D ₉₀	D ₉₅
0.4577	0.6720	0.8961	1.4347	3.4902	6.2300	11.1539	12.3294	13.8504	16.0171

Fineness Modulus	C _u	C _c
4.83	13.61	0.72

REITZ & JENS, INC.
GRAIN SIZE ANALYSIS
 (Sieve or Screen Method)

Project Labadie CCP Properties
 Boring No. Btm Ash
 Sample No. _____
 Depth _____

Test by MPT
 Entered by KOK
 Checked by KOK
 Testing Date 12-17-09

U.S. Standard Sieve Size	Sieve Opening (mm)	Sieve Wgt. + Soil (grams)	Sieve Weight (grams)	Weight Retained (grams)	Cumulative Weight Retained (grams)	Percent Finer by Weight
3-in.	75					
2-in.	50					
1-1/2 in.	37.5					
1 in.	25.4					
3/4-in.	19.0				0	
1/2-in.	12.7				139.63	
3/8-in.	9.5				284.25	
#3	6.35					
#4	4.75				455.21	
#6	3.35					
#8	2.36				598.54	
#10	2.00					
#16	1.18				762.30	
#18	1.00					
#20	0.85					
#30	0.60				888.37	
#35	0.50					
#40	0.425					
#50	0.300				960.17	
#60	0.250					
#70	0.212					
#100	0.150				997.77	
#120	0.125					
#140	0.106					
#200	0.075				1014.78	
Pan					1018.66	
Sample Lost in #200 Wash						
Total Weight in Grams						

Pre #200 wash Weights	
Soil + Tare	1530.79
Tare	505.91
Soil	1024.88

Post #200 wash Weights	
Soil + Tare	1524.36
Tare	505.91
Soil	1018.45

Sample Description & Remarks Bottom Ash, tan & grey, fine sand to coarse gravel, pitted

SCHEDULE CIG-ST1
B-13

Reitz & Jens, Inc.

RELATIVE DENSITY TEST (Minimum & Maximum Density Determinations)

Job Ameren; Labadie CCP Testing

Lab Test by MPT Date 12/17/09

Boring No. Bottom Ash

Computed by JLC Date 12/17/09

Depth _____

Checked by KEK Date 12/17/09

Sample No. Bulk

Mold No. Blue Mold

Mold Vol. 0.09995 (cu. ft.) (Vm)

Mold Diam. 6.0 (in)

Mold End Area 0.1961 (sq. ft.) (Am)

Mold Wt. 7.98 (lb.)

$$\text{Relative Density} = \frac{\gamma_{\text{max}} (\gamma_{\text{field}} - \gamma_{\text{min}})}{\gamma_{\text{field}} (\gamma_{\text{max}} - \gamma_{\text{min}})} \times 100$$

MINIMUM DENSITY					
Trial No.			Trial 1		
Weight Lb.	Tare + Soil Dry	W	16.34		
	Tare	W	7.98		
	Soil Dry	W s	8.36		
Min. Dry Density pcf.		γ_d			
Min. Dry Density Average pcf			83.64		
MAXIMUM DENSITY					
Method Used			Near Saturation		
Trial No.			Trial 1		
Height Inches	Initial Dial Reading	h o		0.00	
	Left Dial Reading	h l	1.47		
	Right Dial Reading	h r	1.43		
	Sum	h l + h r	2.9		
	Average Dial Reading	h a		1.45	
	Height Change	Δh		1.45	
Volume cu. ft.	Mold Initial Volume	V m		0.09995	
	Volume Change *	ΔV		0.02369	
	Volume of Soil	V s		0.07626	
Weight Lb.	Tare + Soil Dry	W	16.34		
	Tare	W m	7.98		
	Soil Dry	W s	8.36		
Max. Dry Density pcf.		γ_d			
Max. Dry Density Average pcf.			109.62		

$$* \Delta V = \frac{\Delta h \times A_m}{12}$$

Sample Description & Remarks Bottom ash, tan and grey, fine sand to coarse gravel in size, pitted

Reitz & Jens, Inc.

RELATIVE DENSITY TEST (Minimum & Maximum Density Determinations)

Job Labadie

Boring No. Btm Ash

Depth _____

Sample No. _____

Mold Vol. 0.09995 (cu. ft.) (Vm)

Mold End Area 0.1961 (sq. ft.) (Am)

Lab Test by MPT Date 12/17/09

Computed by JLC Date 12/17/09

Checked by KAL Date 12/18/09

Mold No. Blue

Mold Diam. 4 (in)

Mold Wt. 7.98 (lb.)

$$\text{Relative Density} = \frac{\rho_{\text{max}} - (\rho_{\text{field}} - \rho_{\text{min}})}{\rho_{\text{field}} (\rho_{\text{max}} - \rho_{\text{min}})} \times 100$$

MINIMUM DENSITY

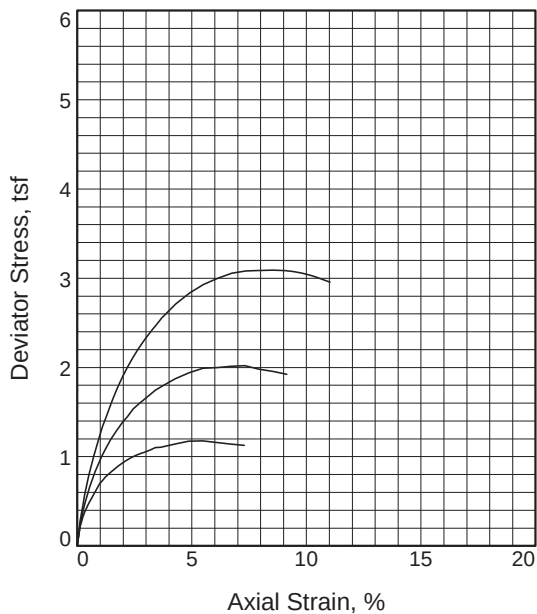
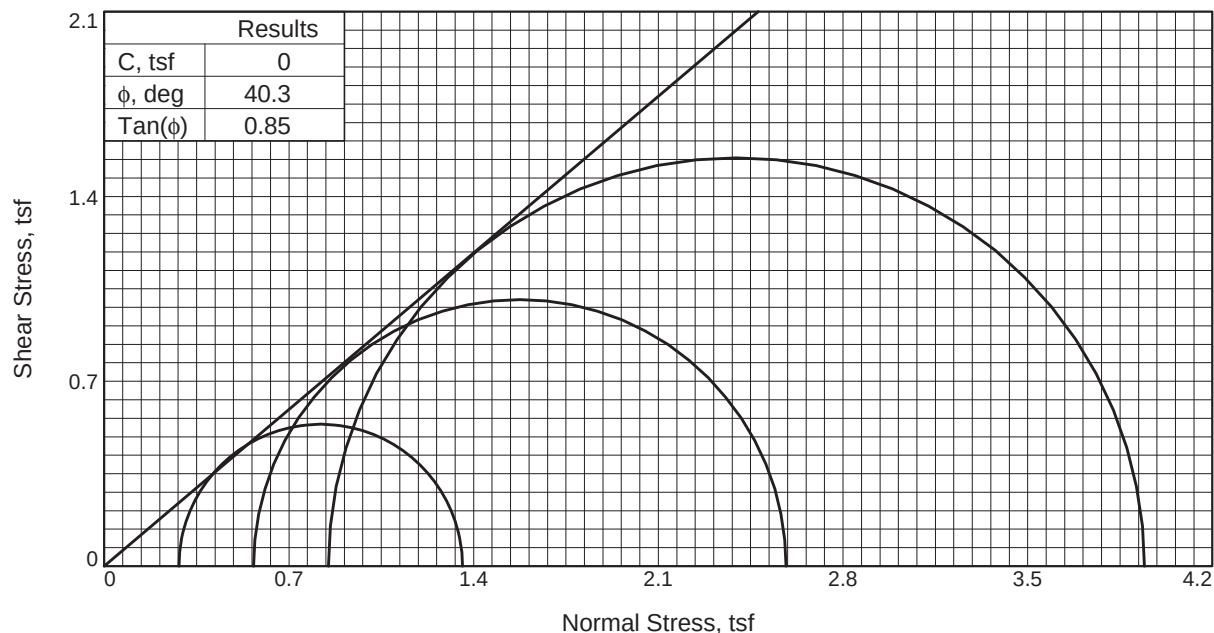
Trial No.			
Weight	Tare + Soil Dry	W	<u>16.34</u>
	Tare	W	<u>7.98</u>
Lb.	Soil Dry	W s	<u>8.36</u>
Min. Dry Density pcf.		ρ_d	
Min. Dry Density Average pcf			<u>83.64</u>

MAXIMUM DENSITY

Method Used			
Trial No.			
Height Inches	Initial Dial Reading	h o	
	Left Dial Reading	h l	<u>1.47</u>
	Right Dial Reading	h r	<u>1.43</u>
	Sum	h l + h r	
	Average Dial Reading	h a	<u>1.45</u>
	Height Change	Δh	<u>1.45</u>
Volume cu. ft.	Mold Initial Volume	V m	<u>0.09995</u>
	Volume Change *	ΔV	<u>0.02369</u>
	Volume of Soil	V s	<u>0.08626</u>
Weight Lb.	Tare + Soil Dry	W	<u>16.34</u>
	Tare	W m	<u>7.98</u>
	Soil Dry	W s	<u>8.36</u>
Max. Dry Density pcf.		ρ_d	
Max. Dry Density Average pcf.			<u>109.62</u>

$$* \Delta V = \frac{\Delta h \times A_m}{12}$$

Sample Description & Remarks Bottom Ash



Sample No.		1	2	3
Initial	Water Content,	0.0	0.0	0.0
	Dry Density, pcf	89.2	89.0	90.9
	Saturation,	0.0	0.0	0.0
	Void Ratio	0.9596	0.9631	0.9226
	Diameter, in.	3.79	3.78	3.78
	Height, in.	8.23	8.20	8.16
At Test	Water Content,	0.0	0.0	0.0
	Dry Density, pcf	89.2	89.0	90.9
	Saturation,	0.0	0.0	0.0
	Void Ratio	0.9596	0.9631	0.9226
	Diameter, in.	3.79	3.78	3.78
	Height, in.	8.23	8.20	8.16
Strain rate, %/min.		0.40	0.40	0.40
Back Pressure, tsf		0.00	0.00	0.00
Cell Pressure, tsf		0.28	0.57	0.85
Fail. Stress, tsf		1.07	2.02	3.09
Ult. Stress, tsf		1.18	2.02	3.09
σ_1 Failure, tsf		1.36	2.58	3.94
σ_3 Failure, tsf		0.28	0.57	0.85

Type of Test:

Unconsolidated Undrained

Sample Type: Hand compacted

Description: Bottom Ash, grey and tan, fine sand to coarse gravel size particles, pitted, from pond

Assumed Specific Gravity= 2.80

Remarks: Vacuum Triaxial Test on dry sample

Client: Ameren Missouri

Project: CCP Properties, Labadie Plant

Source of Sample: Bottom Ash

Sample Number: Bulk

Proj. No.: 2008012455

Date: 12/17/09

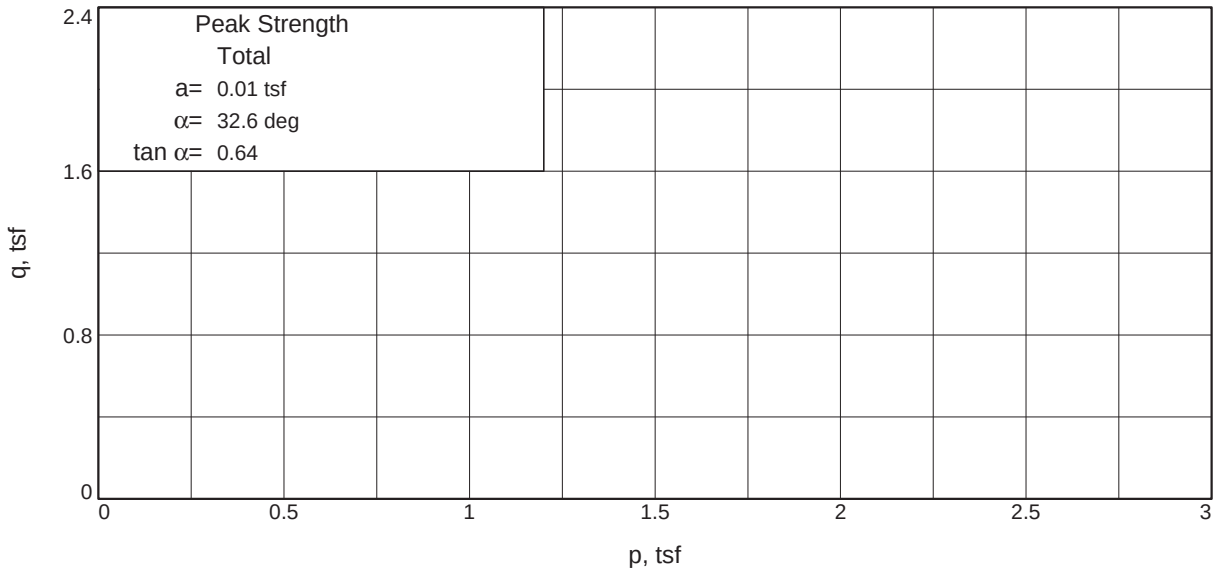
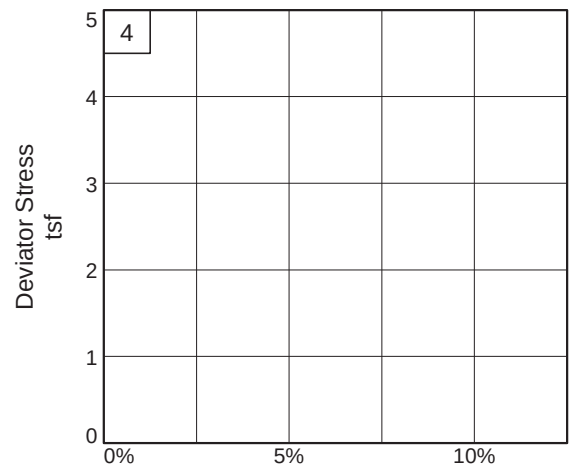
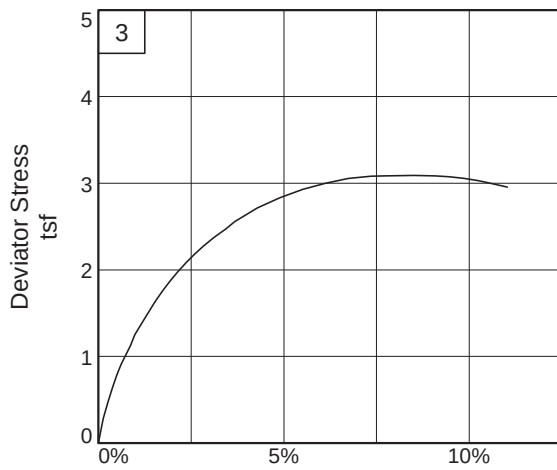
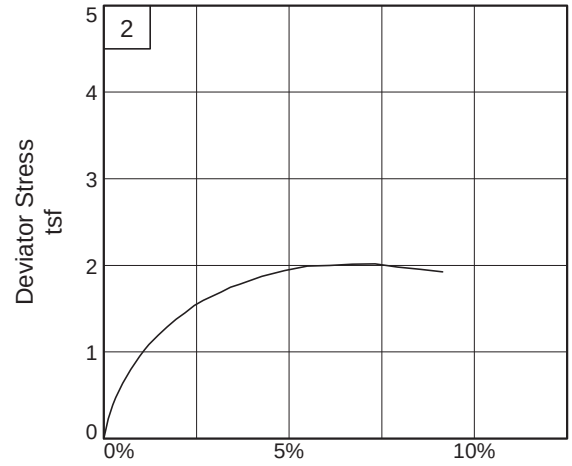
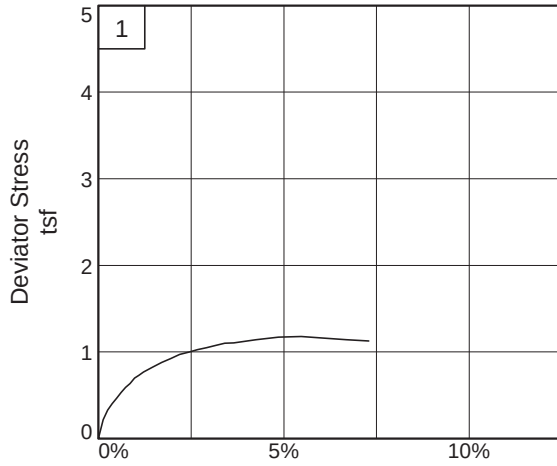


Figure _____

Tested By: K. Kocher

Checked By: J. Fouse

SCHEDULE CJG-ST1
B-15



Client: Ameren Missouri

Project: CCP Properties, Labadie Plant

Source of Sample: Bottom Ash

Project No.: 2008012455

Sample Number: Bulk

Figure _____

REITZ & JENS, INC.

Tested By: K. Kocher

Checked By: J. Fouse

SCHEDULE CJG-ST1
B-15

TRIAXIAL COMPRESSION TEST

Unconsolidated Undrained

5/24/2011

9:40 AM

Date: 12/17/09
Client: Ameren Missouri
Project: CCP Properties, Labadie Plant
Project No.: 2008012455
Location: Bottom Ash
Sample Number: Bulk
Description: Bottom Ash, grey and tan, fine sand to coarse gravel size particles, pitted, from pond
Remarks: Vacuum Triaxial Test on dry sample
Type of Sample: Hand compacted
Assumed Specific Gravity=2.80 **LL=** **PL=** **PI=**
Test Method: ASTM D 2850

Parameters for Specimen No. 1

Specimen Parameter	Initial	Final
Moisture content: Moist soil+tare, gms.	0.100	0.100
Moisture content: Dry soil+tare, gms.	0.100	0.100
Moisture content: Tare, gms.	0.000	0.000
Moisture, %	0.0	0.0
Moist specimen weight, gms.	2172.8	
Diameter, in.	3.79	
Area, in. ²	11.28	
Height, in.	8.23	
Wet Density, pcf	89.2	
Dry density, pcf	89.2	
Void ratio	0.9596	
Saturation, %	0.0	

Test Readings for Specimen No. 1

Cell pressure = 3.93 psi (0.283 tsf)
Back pressure = 0.00 psi (0.000 tsf)
Strain rate, %/min. = 0.40
Fail. Stress = 1.075 tsf at reading no. 18
Ult. Stress = 1.178 tsf at reading no. 23

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress tsf	Minor Princ. Stress tsf	Major Princ. Stress tsf	1:3 Ratio	P tsf	Q tsf
0	0.0000	1.90	0.0	0.0	0.000	0.283	0.283	1.00	0.283	0.000
1	0.0100	36.00	34.1	0.1	0.217	0.283	0.500	1.77	0.392	0.109
2	0.0200	53.50	51.6	0.2	0.329	0.283	0.612	2.16	0.447	0.164
3	0.0300	65.30	63.4	0.4	0.403	0.283	0.686	2.43	0.484	0.202
4	0.0400	75.20	73.3	0.5	0.466	0.283	0.749	2.65	0.516	0.233
5	0.0500	85.80	83.9	0.6	0.532	0.283	0.815	2.88	0.549	0.266
6	0.0600	94.90	93.0	0.7	0.590	0.283	0.872	3.08	0.578	0.295
7	0.0700	102.40	100.5	0.9	0.636	0.283	0.919	3.25	0.601	0.318
8	0.0800	112.00	110.1	1.0	0.696	0.283	0.979	3.46	0.631	0.348
9	0.0900	117.70	115.8	1.1	0.731	0.283	1.014	3.59	0.648	0.366
10	0.1000	123.90	122.0	1.2	0.770	0.283	1.052	3.72	0.668	0.385
11	0.1200	133.00	131.1	1.5	0.825	0.283	1.108	3.92	0.695	0.412
12	0.1400	141.90	140.0	1.7	0.879	0.283	1.162	4.11	0.722	0.439
13	0.1600	149.10	147.2	1.9	0.922	0.283	1.204	4.26	0.744	0.461
14	0.1800	157.20	155.3	2.2	0.970	0.283	1.253	4.43	0.768	0.485
15	0.2000	162.00	160.1	2.4	0.997	0.283	1.280	4.53	0.782	0.499
16	0.2200	167.10	165.2	2.7	1.027	0.283	1.309	4.63	0.796	0.513
17	0.2400	171.20	169.3	2.9	1.050	0.283	1.332	4.71	0.808	0.525
18	0.2600	175.70	173.8	3.2	1.075	0.283	1.358	4.80	0.820	0.537
19	0.2800	180.50	178.6	3.4	1.102	0.283	1.384	4.90	0.834	0.551
20	0.3000	181.60	179.7	3.6	1.106	0.283	1.388	4.91	0.836	0.553
21	0.3500	188.40	186.5	4.3	1.140	0.283	1.423	5.03	0.853	0.570
22	0.4000	194.90	193.0	4.9	1.172	0.283	1.455	5.15	0.869	0.586
23	0.4500	197.10	195.2	5.5	1.178	0.283	1.461	5.17	0.872	0.589
24	0.5000	195.10	193.2	6.1	1.159	0.283	1.442	5.10	0.862	0.579
25	0.5500	193.30	191.4	6.7	1.141	0.283	1.423	5.03	0.853	0.570
26	0.6000	192.10	190.2	7.3	1.126	0.283	1.409	4.98	0.846	0.563

Parameters for Specimen No. 2

Specimen Parameter	Initial	Final
Moisture content: Moist soil+tare, gms.	0.100	0.100
Moisture content: Dry soil+tare, gms.	0.100	0.100
Moisture content: Tare, gms.	0.000	0.000
Moisture, %	0.0	0.0
Moist specimen weight, gms.	2154.2	
Diameter, in.	3.78	
Area, in. ²	11.24	
Height, in.	8.20	
Wet Density, pcf	89.0	
Dry density, pcf	89.0	
Void ratio	0.9631	
Saturation, %	0.0	

Test Readings for Specimen No. 2

Cell pressure = 7.86 psi (0.566 tsf)

Back pressure = 0.00 psi (0.000 tsf)

Strain rate, %/min. = 0.40

Fail. Stress = 2.019 tsf at reading no. 26

Ult. Stress = 2.019 tsf at reading no. 26

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress tsf	Minor Princ. Stress tsf	Major Princ. Stress tsf	1:3 Ratio	P tsf	Q tsf
0	0.0000	1.60	0.0	0.0	0.000	0.566	0.566	1.00	0.566	0.000
1	0.0100	37.30	35.7	0.1	0.228	0.566	0.794	1.40	0.680	0.114
2	0.0200	62.50	60.9	0.2	0.389	0.566	0.955	1.69	0.760	0.195
3	0.0300	81.20	79.6	0.4	0.508	0.566	1.074	1.90	0.820	0.254
4	0.0400	99.40	97.8	0.5	0.623	0.566	1.189	2.10	0.878	0.312
5	0.0500	113.90	112.3	0.6	0.715	0.566	1.281	2.26	0.923	0.357
6	0.0600	127.30	125.7	0.7	0.799	0.566	1.365	2.41	0.966	0.400
7	0.0700	140.30	138.7	0.9	0.881	0.566	1.447	2.56	1.006	0.440
8	0.0800	151.90	150.3	1.0	0.953	0.566	1.519	2.68	1.043	0.477
9	0.0900	162.90	161.3	1.1	1.022	0.566	1.588	2.81	1.077	0.511
10	0.1000	173.00	171.4	1.2	1.085	0.566	1.650	2.92	1.108	0.542
11	0.1200	190.70	189.1	1.5	1.194	0.566	1.760	3.11	1.163	0.597
12	0.1400	206.60	205.0	1.7	1.291	0.566	1.857	3.28	1.211	0.645
13	0.1600	220.90	219.3	2.0	1.377	0.566	1.943	3.43	1.255	0.689
14	0.1800	233.60	232.0	2.2	1.454	0.566	2.019	3.57	1.293	0.727
15	0.2000	247.30	245.7	2.4	1.536	0.566	2.101	3.71	1.334	0.768
16	0.2200	257.40	255.8	2.7	1.595	0.566	2.161	3.82	1.363	0.797
17	0.2400	266.20	264.6	2.9	1.645	0.566	2.211	3.91	1.389	0.823
18	0.2600	274.60	273.0	3.2	1.693	0.566	2.259	3.99	1.413	0.847
19	0.2800	283.90	282.3	3.4	1.747	0.566	2.313	4.09	1.439	0.873
20	0.3000	290.30	288.7	3.7	1.782	0.566	2.348	4.15	1.457	0.891
21	0.3500	307.00	305.4	4.3	1.873	0.566	2.439	4.31	1.502	0.936
22	0.4000	320.00	318.4	4.9	1.940	0.566	2.506	4.43	1.536	0.970
23	0.4500	330.60	329.0	5.5	1.992	0.566	2.558	4.52	1.562	0.996
24	0.5000	333.90	332.3	6.1	1.999	0.566	2.565	4.53	1.565	0.999
25	0.5500	338.40	336.8	6.7	2.013	0.566	2.579	4.56	1.572	1.006
26	0.6000	341.60	340.0	7.3	2.019	0.566	2.585	4.57	1.575	1.009
27	0.6500	337.50	335.9	7.9	1.981	0.566	2.547	4.50	1.556	0.991

Test Readings for Specimen No. 2

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress tsf	Minor Princ. Stress tsf	Major Princ. Stress tsf	1:3 Ratio	P tsf	Q tsf
28	0.7000	335.40	333.8	8.5	1.956	0.566	2.522	4.46	1.544	0.978
29	0.7500	332.20	330.6	9.1	1.924	0.566	2.490	4.40	1.528	0.962

Parameters for Specimen No. 3

Specimen Parameter	Initial	Final
Moisture content: Moist soil+tare, gms.	0.100	0.100
Moisture content: Dry soil+tare, gms.	0.100	0.100
Moisture content: Tare, gms.	0.000	0.000
Moisture, %	0.0	0.0
Moist specimen weight, gms.	2183.1	
Diameter, in.	3.78	
Area, in. ²	11.21	
Height, in.	8.16	
Wet Density, pcf	90.9	
Dry density, pcf	90.9	
Void ratio	0.9226	
Saturation, %	0.0	

Test Readings for Specimen No. 3

Cell pressure = 11.80 psi (0.850 tsf)

Back pressure = 0.00 psi (0.000 tsf)

Strain rate, %/min. = 0.40

Fail. Stress = 3.093 tsf at reading no. 28

Ult. Stress = 3.093 tsf at reading no. 28

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress tsf	Minor Princ. Stress tsf	Major Princ. Stress tsf	1:3 Ratio	P tsf	Q tsf
0	0.0000	1.30	0.0	0.0	0.000	0.850	0.850	1.00	0.850	0.000
1	0.0100	44.80	43.5	0.1	0.279	0.850	1.129	1.33	0.989	0.140
2	0.0200	73.20	71.9	0.2	0.461	0.850	1.310	1.54	1.080	0.230
3	0.0300	99.60	98.3	0.4	0.629	0.850	1.479	1.74	1.164	0.315
4	0.0400	123.50	122.2	0.5	0.781	0.850	1.631	1.92	1.240	0.391
5	0.0500	143.90	142.6	0.6	0.910	0.850	1.760	2.07	1.305	0.455
6	0.0600	161.20	159.9	0.7	1.019	0.850	1.869	2.20	1.359	0.510
7	0.0700	177.80	176.5	0.9	1.124	0.850	1.973	2.32	1.412	0.562
8	0.0800	198.10	196.8	1.0	1.252	0.850	2.101	2.47	1.475	0.626
9	0.0900	211.80	210.5	1.1	1.337	0.850	2.187	2.57	1.518	0.669
10	0.1000	225.50	224.2	1.2	1.422	0.850	2.272	2.67	1.561	0.711
11	0.1200	253.60	252.3	1.5	1.597	0.850	2.446	2.88	1.648	0.798
12	0.1400	278.60	277.3	1.7	1.750	0.850	2.600	3.06	1.725	0.875
13	0.1600	300.80	299.5	2.0	1.886	0.850	2.735	3.22	1.793	0.943
14	0.1800	321.70	320.4	2.2	2.012	0.850	2.862	3.37	1.856	1.006
15	0.2000	340.00	338.7	2.5	2.122	0.850	2.972	3.50	1.911	1.061
16	0.2200	356.90	355.6	2.7	2.222	0.850	3.072	3.62	1.961	1.111
17	0.2400	372.70	371.4	2.9	2.315	0.850	3.165	3.73	2.007	1.158
18	0.2600	387.00	385.7	3.2	2.398	0.850	3.248	3.82	2.049	1.199
19	0.2800	399.80	398.5	3.4	2.472	0.850	3.321	3.91	2.085	1.236
20	0.3000	414.40	413.1	3.7	2.556	0.850	3.405	4.01	2.127	1.278
21	0.3500	442.80	441.5	4.3	2.714	0.850	3.564	4.19	2.207	1.357

Test Readings for Specimen No. 3

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress tsf	Minor Princ. Stress tsf	Major Princ. Stress tsf	1:3 Ratio	P tsf	Q tsf
22	0.4000	465.40	464.1	4.9	2.835	0.850	3.684	4.34	2.267	1.417
23	0.4500	484.40	483.1	5.5	2.932	0.850	3.781	4.45	2.315	1.466
24	0.5000	498.80	497.5	6.1	3.000	0.850	3.849	4.53	2.349	1.500
25	0.5500	511.50	510.2	6.7	3.056	0.850	3.906	4.60	2.378	1.528
26	0.6000	519.00	517.7	7.4	3.081	0.850	3.930	4.63	2.390	1.540
27	0.6500	523.40	522.1	8.0	3.086	0.850	3.936	4.63	2.393	1.543
28	0.7000	528.00	526.7	8.6	3.093	0.850	3.942	4.64	2.396	1.546
29	0.7500	529.40	528.1	9.2	3.080	0.850	3.930	4.63	2.390	1.540
30	0.8000	529.10	527.8	9.8	3.058	0.850	3.907	4.60	2.378	1.529
31	0.8500	525.20	523.9	10.4	3.014	0.850	3.864	4.55	2.357	1.507
32	0.9000	518.80	517.5	11.0	2.957	0.850	3.807	4.48	2.328	1.479

Test by K. Kaker
Entered by K. Kaker
Checked by J. Foulge
Testing Date 4-26-11

Description of Test Sample Dry Lahadig Bottom Ash, lightly compacted into mold

Sample Density	
Wet Wt. of Sample (grams)	2172.81
Diameter of Sample (Inches)	D= 3.789
Length of Sample (Inches)	L= 8.23
Density Constant $C = (4.85 / (D^2 * L))$	
Wet Density (pcf)	
Dry Density (pcf)	

4472.17
2299.36

Rate of Load Application	%/min
Confining Pressure	8.0
Mass of Top Cap	gms

20 on dial

icles of the ex.
Vaccine

Notes:

Strain (.001")	Load (lbs)
240	171.2
260	175.7
280	180.5
300	181.6
350	188.4
400	194.9
450	197.1
500	195.1
550	193.3
600	192.1
650	
700	
750	
800	
850	
900	
1000	

Notes:

SCHEDULE CJG-ST1
B-15

Unconsolidated Undrained or Unconfined Test

Project American Labadie UWL
 Boring No. —
 Sample No. —
 Depth —

Test by K. Kachur
 Entered by K. Kachur
 Checked by J. Fouse
 Testing Date 4-26-11

Description of Entire Tube —

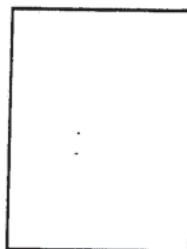
Description of Test Sample SAME AS 8.0 inches of Mod.

Moisture Contents		
	Trial 1	Trial 2
Tare #		
Wet Wt.+Tare		
Dry Wt.+Tare		
Wt. of Water		
Tare Wt.		
Wt. of Soil		
% Moisture		
Average % Moisture=	<u>0.0</u>	

Sample Density	
Wet Wt. of Sample (grams)	<u>2154.20</u>
Diameter of Sample (Inches)	<u>D= 3.783</u>
Length of Sample (Inches)	<u>L= 8.20</u>
Density Constant $C = (4.85 / (D^2 * L))$	
Wet Density (pcf)	
Dry Density (pcf)	

4467.2
2313.0

Failure Sketch



Rate of Load Application — %/min
 7.84 Confining Pressure 16 ~~PSI~~ inches of water
 Mass of Top Cap — gms

Strain (.001")	Load (lbs)
0	<u>1.6</u>
10	<u>37.3</u>
20	<u>62.5</u>
30	<u>81.2</u>
40	<u>99.4</u>
50	<u>113.9</u>
60	<u>127.3</u>
70	<u>140.3</u>
80	<u>151.9</u>
90	<u>162.9</u>
100	<u>173.0</u>
120	<u>190.7</u>
140	<u>206.6</u>
160	<u>220.9</u>
180	<u>233.6</u>
200	<u>247.3</u>
220	<u>257.4</u>

Notes:

Strain (.001")	Load (lbs)
240	<u>266.2</u>
260	<u>274.6</u>
280	<u>283.9</u>
300	<u>290.3</u>
350	<u>307.0</u>
400	<u>320.0</u>
450	<u>330.6</u>
500	<u>333.9</u>
550	<u>338.4</u>
600	<u>341.6</u>
650	<u>337.5</u>
700	<u>335.4</u>
750	<u>332.2</u>
800	
850	
900	
1000	

Notes:

SCHEDULE CJG-ST1
 B-15

Unconsolidated Undrained or Unconfined Test

Project American Unbade UWL
 Boring No. —
 Sample No. —
 Depth —

Test by K. Kocher
 Entered by K. Kocher
 Checked by J. Fong
 Testing Date 4-26-11

Description of Entire Tube —

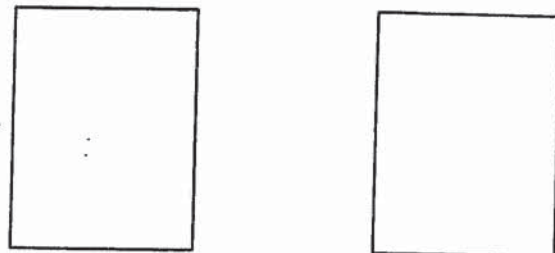
Description of Test Sample Same AS 8 inches of PVC.

Moisture Contents		
	Trial 1	Trial 2
Tare #		
Wet Wt.+Tare		
Dry Wt.+Tare		
Wt. of Water		
Tare Wt.		
Wt. of Soil		
% Moisture		
Average % Moisture=	<u>0.0</u>	

Sample Density	
Wet Wt. of Sample (grams)	<u>2183.11</u>
Diameter of Sample (Inches)	<u>D= 3.778</u>
Length of Sample (Inches)	<u>L= 8.16</u>
Density Constant	
$C = (4.85 / (D^2 * L))$	
Wet Density (pcf)	
Dry Density (pcf)	

4464.89
2281.78

Failure Sketch



Rate of Load Application — %/min
 11.8 Confining Pressure 24.0 ✓ inches of stress.
 Mass of Top Cap — gms

Strain (.001")	Load (lbs)
0	<u>1.3</u>
10	<u>44.8</u>
20	<u>73.2</u>
30	<u>99.6</u>
40	<u>123.5</u>
50	<u>193.9</u>
60	<u>161.2</u>
70	<u>177.8</u>
80	<u>198.1</u>
90	<u>211.8</u>
100	<u>225.5</u>
120	<u>253.6</u>
140	<u>278.6</u>
160	<u>300.8</u>
180	<u>321.7</u>
200	<u>340.0</u>
220	<u>356.9</u>

Notes:

Strain (.001")	Load (lbs)
240	<u>372.7</u>
260	<u>387.0</u>
280	<u>399.8</u>
300	<u>414.4</u>
350	<u>442.8</u>
400	<u>465.4</u>
450	<u>484.4</u>
500	<u>498.8</u>
550	<u>511.5</u>
600	<u>519.0</u>
650	<u>523.4</u>
700	<u>528.0</u>
750	<u>529.4</u>
800	<u>529.1</u>
850	<u>525.2</u>
900	<u>518.8</u>
1000	

Notes:

SCHEDULE CJG-ST1
B-15

CONSTANT HEAD PERMEABILITY TEST

Project Ameren; Labadie CCP Testing

Date 04/15/11

SoilDescription Bottom Ash, loosely placed in the cylinder

Test Cylinder Diameter 3.0" Area 45.6 (sq cm)

Sample Length To Bottom 11.6" To Top 2.9" Length 8.70" (in)_

Weight Dry Material Initial Tare + Sample 4529.89 (gms)_
Used Final Tare + Sample 3210.41 (gms)
Material Weight 1319.48 (gms)

Sample Density K x Material Weight = 81.7 (pcf)_

K = $4.85 / (D^2 \times L)$

D in inches, L in inches

Trial No.	top mano-meter	Bottom Mano-meter	Head Loss	Length between ports	Water Wt + Tare (gms)	Tare (gms)	volume of flow (gms=cc)	time (sec)	Temp (C)
1	-	-	2.79 cm	10.3 cm			1000 cc	89 sec	26.35
2	-	-	9.02 cm	10.3 cm			1000 cc	49 sec	27.97
3	-	-	9.53 cm	10.3 cm			1000 cc	40 sec	29.68
4	-	-	5.51 cm	10.3 cm			1000 cc	64 sec	30.98

Trial	K for test temp K = Flow / ((h/l) x area x time)	K for 20 C. μ_{20} / μ_t
1	K = 0.910 cm/sec	K for 20C = 0.785 cm/sec
2	K = 0.511 cm/sec	K for 20C = 0.425 cm/sec
3	K = 0.593 cm/sec	K for 20C = 0.476 cm/sec
4	K = 0.641 cm/sec	K for 20C = 0.500 cm/sec

$\mu_{20} = 1.005$ centipoises

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rev. Sept. 09, 2002

CONSTANT HEAD PERMEABILITY TEST

Project Ameron Labadie Well

Date 4-15-11

Soil Description Labadie bottom ash (Minimum density possible)

Test Cylinder Diameter 3.0 inches Area 45.6 cm² (sq cm)

Sample Length To Bottom 11.6" To Top 2.9" Length 8.70" (in)

Weight Dry Material Used Initial Tare + Sample 4529.89g (gms)
Final Tare + Sample 3210.41g (gms)
Material Weight 1319.48g (gms)

Sample Density K x Material Weight = 81.7 pcf (pcf)
K = 4.85/(D² x L)

D in inches, L in inches

Trial No.	top manometer	Bottom Manometer	Head Loss (cm)	Length between ports (cm)	Water Wt + Tare (gms)	Tare (gms)	volume of flow (gms=cc)	time (sec)	Temp (C)
1			2.79 cm	10.3			1000 cm	89 sec	26.35
2			9.02	10.3			1000 cm	49 sec	27.97
3			9.53	10.3			1000 cm	40 sec	29.68
4			5.51	10.3			1000 cm	64 sec	30.98

Trial	K for test temp K = Flow / ((h/l) x area x time)	K for 20 C. Mu _t / Mu ₂₀
1	$K = \frac{(1000)(10.3)}{(45.6)(89)(2.79)} = 0.910 \text{ cm/sec}$	$K_{20C} = \left(\frac{0.8670}{1.005}\right)(0.910) \Rightarrow K_{20C} = 0.785 \text{ cm/sec}$
2	$K = \frac{(1000)(10.3)}{(45.6)(49)(9.02)} = 0.511 \text{ cm/sec}$	$K_{20C} = \left(\frac{0.8340}{1.005}\right)(0.511) \Rightarrow K_{20C} = 0.425 \text{ cm/sec}$
3	$K = \frac{(1000)(10.3)}{(45.6)(40)(9.53)} = 0.593 \text{ cm/sec}$	$K_{20C} = \left(\frac{0.806}{1.005}\right)(0.593) \Rightarrow K_{20C} = 0.476 \text{ cm/sec}$
4	$K = \frac{(1000)(10.3)}{(45.6)(64)(5.51)} = 0.641 \text{ cm/sec}$	$K_{20C} = \left(\frac{0.7840}{1.005}\right)(0.641) \Rightarrow K_{20C} = 0.500 \text{ cm/sec}$

Mu₂₀ = 1.005 centipoises

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rev. Sept. 09, 2002

CONSTANT HEAD PERMEABILITY TEST

Project Ameren; Labadie CCP Testing

Date 04/15/11

SoilDescription Bottom Ash, densified in the cylinder

Test Cylinder Diameter 3.0" Area 45.6 (sq cm)

Sample Length To Bottom 11.5" To Top 3.05" Length 8.45" (in)_

Weight Dry Material Initial Tare + Sample 3210.41 (gms)_
Used Final Tare + Sample 1700.86 (gms)
Material Weight 1509.55 (gms)

Sample Density K x Material Weight = 96.3 (pcf)_

K = $4.85 / (D^2 \times L)$

D in inches, L in inches

Trial No.	top mano-meter	Bottom Mano-meter	Head Loss	Length between ports	Water Wt + Tare (gms)	Tare (gms)	volume of flow (gms=cc)	time (sec)	Temp (C)
1	-	-	6.99 cm	10.3 cm			1000 cc	290 sec	24.25
2	-	-	13.2 cm	10.3 cm			1000 cc	155 sec	24.79
3*	-	-	21.2 cm	10.3 cm			1000 cc	139 sec	22.30

Trial	K for test temp K = Flow / ((h/l) x area x time)	K for 20 C. μ_t / μ_{20}
1	K = 0.111 cm/sec	K for 20C = 0.100 cm/sec
2	K = 0.110 cm/sec	K for 20C = 0.098 cm/sec
3*	K = 0.077 cm/sec	K for 20C = 0.073 cm/sec
	* May have had clogging or migration of material during test	

$\mu_{20} = 1.005$ centipoises

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CONSTANT HEAD PERMEABILITY TEST

Project American Labadie UWL

Date 4-15-2011

Soil Description Labadie Bottom Ash (Densified in cylinder)

Test Cylinder Diameter 3" = 7.62 cm Area 45.6 (sq cm)

Sample Length To Bottom 11.5" To Top 3.05" Length 8.45 (in)

Weight Dry Material Used Initial Tare + Sample 3210.41 (gms)
Final Tare + Sample 1700.86 (gms)
Material Weight 1509.55 (gms)

Sample Density K x Material Weight = 96.3 pcf (pcf)
 $K = 4.85 / (D^2 \times L)$

D in inches, L in inches

Trial No.	top manometer	Bottom Manometer	Head Loss (cm)	Length between ports (cm)	Water Wt + Tare (gms)	Tare (gms)	volume of flow (gms=cc)	time (sec)	Temp (C)
1			6.99	10.3 cm			1000 cc	290 sec	24.25
2			13.2	10.3 cm			1000 cc	155 sec	24.79
3*			21.2	10.3 cm			1000 cc	139 sec	22.30
4									

*Clogging?
or
migration?

Trial	K for test temp $K = \text{Flow} / ((h/l) \times \text{area} \times \text{time})$	K for 20 C. μ_{20} / μ_{20}
1	$K = \frac{(1000)(10.3)}{(45.6)(290)(6.99)} = 0.111 \text{ cm/sec}$	$K_{20} = (0.111) \left(\frac{0.909}{1.005} \right) \Rightarrow K_{20} = 0.100 \text{ cm/sec}$
2	$K = \frac{(1000)(10.3)}{(45.6)(155)(13.2)} = 0.110 \text{ cm/sec}$	$K_{20} = (0.110) \left(\frac{0.898}{1.005} \right) \Rightarrow K_{20} = 0.098 \text{ cm/sec}$
3*	$K = \frac{(1000)(10.3)}{(45.6)(139)(21.2)} = 0.077 \text{ cm/sec}$	$K_{20} = (0.077) \left(\frac{0.951}{1.005} \right) \Rightarrow K_{20} = 0.073 \text{ cm/sec}$

$\mu_{20} = 1.005$ centipoises

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Consulting Engineers

R&J Project:

Sheet _____

Boring: Labadie Fly Ash

Sample: _____ Depth: _____

Date: 8/16/10

Test By: _____

100% Fly Ash

EPA Method 9095B Paint Filter Liquids Test

Fluted Glass Funnel

Rings and Ring Stand

Glass Beaker

SCHEDULE CIG-ST1
Figure B-17

Consulting Engineers

R&J Project: Ameren UE - CCP Ash Study Sheet

Date: 8/18/10

46% Fly
20% Btm
34% Cyp.

Test By: _____

EPA Method 9095B Paint Filter Liquids Test

Fluted Glass Funnel

Rings and Ring Stand

Glass Beaker

SCHEDULE CIG-ST1
Figure B-18

Consulting Engineers

R&J Project:

Ameren UE - CCP Ash Study

Sheet _____

Boring: Laindie Blend

Sample: _____ Depth: _____

Date: 8/28/20

30% Fly
25% Btm
45% GYP

Test By:

EPA Method 9095B Paint Filter Liquids Test

Equip: Conical paint filter (mesh #60 +/-5% fine meshed size)

Fluted Glass Funnel

Rings and Ring Stand

Glass Beaker

Procedure: Add water to sample, mix thoroughly and place in paper paint funnel. Allow to sit statically for 5 minutes. If it drips then it has free liquids, if not run immediately run 2 minutes on vibratory table on desired frequency. Document after each process of passing or failing the test time limit at the given moistures.

Consulting Engineers

R&J Project: Ameren UE - CCP ABH Study Sheet

Date: 8/8/10

Test By: _____

36% Fly
64% Cyp.

EPA Method 9095B Paint Filter Liquids Test

Fluted Glass Funnel

Rings and Ring Stand

Glass Beaker

Figure B-20
SCHEDULE C-JG-ST1

Labadie 46% Fly Ash 20% Bottom Ash 34% Pre-Pump Duck Creek Gypsum

Trial #	1	2	3	4	5	6
Minimum Density						
Tare + Material (g)	933.56	943.03	931.54	929.15	927.91	944.08
Tare (g)	67.76	68.09	67.24	68.39	67.26	67.18
Material (g)	865.8	874.94	864.3	860.76	860.65	876.9
Diameter (in)	3.057	3.0595	3.0678	3.056	3.0588	3.0618
Length (in)	5.9404	5.9383	5.9375	5.9466	5.9411	5.9436
X-Section Area (in ²)	7.339741	7.351751	7.391694	7.33494	7.348387	7.362809
Volume (in ³)	43.601	43.6569	43.88818	43.61796	43.6575	43.76159
Density (g/in ³)	19.85734	20.04127	19.69323	19.73407	19.71368	20.03812
Density (pcf)	75.64829	76.349	75.02309	75.17869	75.10099	76.33698
Density After 8 Minutes of Vibration						
Change in Length	1.502	1.165	1.3625	1.101	1.2955	1.063
Change in Length	1.449	1.379	1.1685	1.421	1.472	1.3405
Change in Length	1.406	1.597	1.2955	1.5865	1.437	1.644
Change in Length	1.2335	1.51	1.5305	1.453	1.3085	1.5755
Average Change in Length	1.397625	1.41275	1.33925	1.390375	1.37825	1.40575
Change in Volume	10.25821	10.38619	9.899326	10.19832	10.12791	10.35027
New Volume	33.34279	33.27072	33.98886	33.41964	33.52959	33.41132
Density (g/in ³)	25.96663	26.2976	25.42892	25.75611	25.66837	26.24559
Density (pcf)	98.92216	100.183	96.87372	98.12018	97.78592	99.9849

Average= 75.60617 Stand. Dev.= 0.610833

Average= 98.64498 Stand. Dev.= 1.295264

Reitz & Jens, Inc.

RELATIVE DENSITY TEST

(Minimum & Maximum Density Determinations)

Job Ameren UE - CCP Ash Study
 Boring No. Labadie Fly Ash #10
 Depth + Bottom Ash 20%
 Sample No. + D.C. Repump "Dry" Exp 34%
 Mold Vol. .0252 / .0253 (cu. ft.) (Vm)
 Mold End Area .05097 / .05105 (sq. ft.) (Am)

Lab Test by JA Date 8/7/10
 Computed by _____ Date _____
 Checked by _____ Date _____
 Mold No. _____
 Mold Diam. _____ (in)
 Mold Wt. _____ (lb.)

$$\text{Relative Density} = \frac{\gamma_{\text{max.}} (\gamma_{\text{field}} - \gamma_{\text{min.}})}{\gamma_{\text{field}} (\gamma_{\text{max.}} - \gamma_{\text{min.}})} \times 100$$

MINIMUM DENSITY

Trial No.					
Weight	Tare + Soil Dry	W	<u>933.50</u>		<u>943.03</u>
	Tare	W	<u>67.76</u>		<u>68.09</u>
Lb.	Soil Dry	W s	<u>865.80</u>	<u>1.9088</u>	<u>874.94</u>
Min. Dry Density pcf.		γ_d			<u>1.9289</u>
Min. Dry Density Average pcf.			<u>75.75</u>		<u>76.24</u>

(8 min) Vibrated

MAXIMUM DENSITY

Method Used					
Trial No.					
Height Inches	Initial Dial Reading	h o	<u>1.5020</u>		<u>1.1650</u>
	Left Dial Reading	h l	<u>1.4490</u>		<u>1.3790</u>
	Right Dial Reading	h r	<u>1.4060</u>		<u>1.5970</u>
	Sum	h l + h r	<u>1.2335</u>		<u>1.5100</u>
	Average Dial Reading	h a			
Height Change		Δh		<u>1.3976</u>	<u>1.41275</u>
Volume cu. ft.	Mold Initial Volume	V m	<u>.0252</u>		<u>.0253</u>
	Volume Change *	ΔV	<u>0.005936</u>		<u>0.00601</u>
	Volume of Soil	V s	<u>0.01926</u>		<u>0.01929</u>
Weight Lb.	Tare + Soil Dry	W			
	Tare	W m			
	Soil Dry	W s	<u>1.9088</u>		<u>1.9289</u>
Max. Dry Density pcf.		γ_d			
Max. Dry Density Average pcf.			<u>99.11</u>		<u>99.99</u>

$$* \Delta V = \frac{\Delta h \times A_m}{12}$$

Sample Description & Remarks

Ave. Minimum = 75.573 pcf
Ave. Vibrated Density after 8 min = 98.587 pcf

Reitz & Jens, Inc.

RELATIVE DENSITY TEST (Minimum & Maximum Density Determinations)

Job _____

Lab Test by _____ Date _____

Boring No. Labadie Blend

Computed by _____ Date _____

Depth 46% Fly + 20% Btm

Checked by _____ Date _____

Sample No. + 34% P.C. "dry" prepump gypsum

Mold No. _____

Mold Vol. .0254 / .0253 (cu. ft.) (Vm)

Mold Diam. _____ (in)

Mold End Area .05133 / .0509 (sq. ft.) (Am)

Mold Wt. _____ (lb.)

$$\text{Relative Density} = \frac{\gamma_{\text{max.}} (\gamma_{\text{field}} - \gamma_{\text{min.}})}{\gamma_{\text{field}} (\gamma_{\text{max.}} - \gamma_{\text{min.}})} \times 100$$

MINIMUM DENSITY

Trial No.		3		4	
Weight	Tare + Soil Dry	W	931.54	929.15	
	Tare	W	67.24	68.39	
Lb.	Soil Dry	W s	864.30	860.76	1.8977
Min. Dry Density pcf.		γ_d			
Min. Dry Density Average pcf			75.02	75.01	

MAXIMUM DENSITY

Method Used					
Trial No.					
Height Inches	Initial Dial Reading	h o	1.3625	1.1010	
	Left Dial Reading	h l	1.1685	1.4210	
	Right Dial Reading	h r	1.2955	1.5865	
	Sum	h l + h r	1.5305	1.4930	
	Average Dial Reading	h a			
	Height Change	Δh			
Volume cu. ft.	Mold Initial Volume	V m	.0254	.0253	
	Volume Change *	ΔV	0.005729	0.00590	
	Volume of Soil	V s	0.01967	0.0194	
Weight Lb.	Tare + Soil Dry	W			
	Tare	W m			
	Soil Dry	W s	1.9055	1.8977	
Max. Dry Density pcf.		γ_d			
Max. Dry Density Average pcf.			96.87	97.82	

* $\Delta V = \frac{\Delta h \times A_m}{12}$

Sample Description & Remarks _____

Reitz & Jens, Inc.

RELATIVE DENSITY TEST (Minimum & Maximum Density Determinations)

Job _____

Lab Test by _____ Date _____

Boring No. Labadie Blend

Computed by _____ Date _____

Depth 46% Fly + 20% Btm

Checked by _____ Date _____

Sample No. + 34% D.C. Prepump "Dry" Gyp

Mold No. _____

Mold Vol. .0253 / .0253 (cu. ft.) (Vm)

Mold Diam. _____ (in)

Mold End Area .0510 / .0511 (sq. ft.) (Am)

Mold Wt. _____ (lb.)

$$\text{Relative Density} = \frac{\gamma_{\text{max.}} (\gamma_{\text{field}} - \gamma_{\text{min.}})}{\gamma_{\text{field}} (\gamma_{\text{max.}} - \gamma_{\text{min.}})} \times 100$$

MINIMUM DENSITY					
Trial No.		5		6	
Weight	Tare + Soil Dry	W	927.91	944.08	
	Tare	W	67.26	67.18	
Lb.	Soil Dry	W s	860.65	876.90	1.9332
Min. Dry Density pcf.		γ_d			
Min. Dry Density Average pcf			75.01	76.41	
MAXIMUM DENSITY					
Method Used					
Trial No.					
Height Inches	Initial Dial Reading	h o	1.2955	1.0630	
	Left Dial Reading	h l	1.4720	1.3405	
	Right Dial Reading	h r	1.4370	1.6440	
	Sum	h l + h r	1.3085	1.5755	
	Average Dial Reading	h a			
	Height Change	Δh		1.37825	1.40575
Volume cu. ft.	Mold Initial Volume	V m	.0253	.0253	
	Volume Change *	ΔV	0.005858	0.005966	
	Volume of Soil	V s	0.01944	0.01931	
Weight Lb.	Tare + Soil Dry	W			
	Tare	W m			
	Soil Dry	W s	1.8978		1.9332
Max. Dry Density pcf.		γ_d			
Max. Dry Density Average pcf.			97.62	100.11	

$$* \Delta V = \frac{\Delta h \times A_m}{12}$$

Sample Description & Remarks _____

Labadie 30% Fly Ash 25% Bottom Ash 45% Pre-Pump Duck Creek Gypsum

Trial #	1	2	3	4	5	6
Minimum Density						
Tare + Material (g)	938.32	968.87	944.79	970.5	954.38	970.48
Tare (g)	67.76	68.09	67.24	68.39	67.26	67.18
Material (g)	870.56	900.78	877.55	902.11	887.12	903.3
Diameter (in)	3.057	3.0595	3.0678	3.056	3.0588	3.0618
Length (in)	5.9404	5.9383	5.9375	5.9466	5.9411	5.9436
X-Section Area (in ²)	7.339741	7.351751	7.391694	7.33494	7.348387	7.362809
Volume (in ³)	43.601	43.6569	43.88818	43.61796	43.6575	43.76159
Density (g/in ³)	19.96651	20.63316	19.99513	20.68208	20.31999	20.64139
Density (pcf)	76.06419	78.60385	76.17321	78.7902	77.41078	78.63519
Density After 8 Minutes of Vibration						
Change in Length	1.0455	0.9965	1.3665	1.03	1.2495	1.4315
Change in Length	1.2555	1.359	0.995	1.195	1.112	1.334
Change in Length	1.5755	1.601	1.238	1.404	1.336	1.187
Change in Length	1.4545	1.397	1.6575	1.311	1.427	1.218
Average Change in Length	1.33275	1.338375	1.31425	1.235	1.281125	1.292625
Change in Volume	9.78204	9.8394	9.714534	9.058651	9.414203	9.517351
New Volume	33.81896	33.8175	34.17365	34.5593	34.2433	34.24424
Density (g/in ³)	25.74177	26.6365	25.67914	26.10325	25.90638	26.37816
Density (pcf)	98.06555	101.4741	97.82695	99.44261	98.69263	100.4899

Average= 77.6129 Stand. Dev.= 1.258977

Average= 99.33196 Stand. Dev.= 1.429645

Figure B-22
SCHEDULE CJG-ST1

RELATIVE DENSITY TEST

(Minimum & Maximum Density Determinations)

Job Ameren UE - CCP Ash Study
 Boring No. Labadie Fly Ash 30%
+ Bitm Ash 25%
 Depth _____
 Sample No. + Duck Creek Prepump "Dry" GYP
@ 45%
 Mold Vol. .0252 / .0253 (cu. ft.) (Vm)
 Mold End Area 0.5097 / .05105 (sq. ft.) (Am)

Lab Test by _____ Date _____
 Computed by _____ Date _____
 Checked by _____ Date _____
 Mold No. _____
 Mold Diam. _____ (in)
 Mold Wt. _____ (lb.)

$$\text{Relative Density} = \frac{\rho_{\text{max.}} (\rho_{\text{field}} - \rho_{\text{min.}})}{\rho_{\text{field}} (\rho_{\text{max.}} - \rho_{\text{min.}})} \times 100$$

MINIMUM DENSITY					
Trial No.		1			
Weight	Tare + Soil Dry	W	938.32		968.87
	Tare	W	67.76		68.09
Lb.	Soil Dry	W s	870.56	1.9193	900.78
					1.9859
Min. Dry Density pcf.		ρ_d			
Min. Dry Density Average pcf.			76.16		78.49
Vibrated (8 min.) MAXIMUM DENSITY					
Method Used					
Trial No.					
Height Inches	Initial Dial Reading	h o	1.0455		0.9965
	Left Dial Reading	h l	1.2555		1.3590
	Right Dial Reading	h r	1.5755		1.6010
	Sum	h l + h r	1.4545		1.3970
	Average Dial Reading	h a			
	Height Change	Δh		1.33275	1.33838
Volume cu. ft.	Mold Initial Volume	V m	.0252		.0253
	Volume Change *	ΔV	0.005161		0.005694
	Volume of Soil	V s	0.01954		0.01961
Weight Lb.	Tare + Soil Dry	W			
	Tare	W m			
	Soil Dry	W s	1.9193		1.9859
Max. Dry Density pcf.		ρ_d			
Max. Dry Density Average pcf.			98.22		101.27

$$* \Delta V = \frac{\Delta h \times A_m}{12}$$

Sample Description & Remarks

Ave. Minimum Density = 77.573 pcf
Average Density after 8 min. vibration = 99.257 pcf

Reitz & Jens, Inc.

RELATIVE DENSITY TEST

(Minimum & Maximum Density Determinations)

Job Labadie Blend
 Boring No. 3076 Fly
 Depth 25 1/2 Btm
 Sample No. +45% O.C. "dy" Gyp.
 Mold Vol. .0254 / .0253 (cu. ft.) (Vm)
 Mold End Area .05133 / .0509 (sq. ft.) (Am)

Lab Test by _____ Date _____
 Computed by _____ Date _____
 Checked by _____ Date _____
 Mold No. _____
 Mold Diam. _____ (in)
 Mold Wt. _____ (lb.)

$$\text{Relative Density} = \frac{\rho_{\text{max.}} (\rho_{\text{field}} - \rho_{\text{min.}})}{\rho_{\text{field}} (\rho_{\text{max.}} - \rho_{\text{min.}})} \times 100$$

MINIMUM DENSITY							
Trial No.		3			4		
Weight	Tare + Soil Dry	W	944.79		970.50		
	Tare	W	67.24		68.39		
Lb.	Soil Dry	W s	877.55	1.9347	902.11	1.9888	
Min. Dry Density pcf.		ρ_d					
Min. Dry Density Average pcf.			76.17		78.61		
MAXIMUM DENSITY							
Method Used							
Trial No.							
Height Inches	*Initial Dial Reading	h o	1.3065		1.0300		
	Left Dial Reading	h l	0.9950		1.1950		
	Right Dial Reading	h r	1.2380		1.4040		
	Sum	h l + h r	1.16575		1.3110		
	Average Dial Reading	h a					
	Height Change	Δh		1.3140		1.2350	
Volume cu. ft.	Mold Initial Volume	V m	.0254		.0253		
	Volume Change *	ΔV	0.005621		0.005238		
	Volume of Soil	V s	0.01978		0.02006		
Weight Lb.	Tare + Soil Dry	W					
	Tare	W m					
	Soil Dry	W s		1.9347		1.9888	
Max. Dry Density pcf.		ρ_d					
Max. Dry Density Average pcf.			97.81		99.14		

$$* \Delta V = \frac{\Delta h \times A_m}{12}$$

Sample Description & Remarks _____

Reitz & Jens, Inc.

RELATIVE DENSITY TEST (Minimum & Maximum Density Determinations)

Job Lakeview Blend

Lab Test by _____ Date _____

Boring No. 306 Fly

Computed by _____ Date _____

Depth 25' Btm

Checked by _____ Date _____

Sample No. + 456 O.C. "Dry" prepump G.P.

Mold No. _____

Mold Vol. .02531 .0253 (cu. ft.) (Vm)

Mold Diam. _____ (in)

Mold End Area .0510 (.0511) (sq. ft.) (Am)

Mold Wt. _____ (lb.)

$$\text{Relative Density} = \frac{\gamma_{\text{max.}} (\gamma_{\text{field}} - \gamma_{\text{min.}})}{\gamma_{\text{field}} (\gamma_{\text{max.}} - \gamma_{\text{min.}})} \times 100$$

MINIMUM DENSITY					
Trial No.		5			
Weight	Tare + Soil Dry	W	954.38	970.48	
	Tare	W	67.26	67.18	
Lb.	Soil Dry	W s	887.12	1.95576	1.9914
Min. Dry Density pcf.		γ_d			
Min. Dry Density Average pcf.			77.30		78.71
MAXIMUM DENSITY					
Method Used					
Trial No.					
Height Inches	Initial Dial Reading	h o	1.2495		1.4315
	Left Dial Reading	h l	1.1120		1.3340
	Right Dial Reading	h r	1.3360		1.1810
	Sum	h l + h r	1.4270		1.2180
	Average Dial Reading	h a			
	Height Change	Δh		1.2811	1.2926
Volume cu. ft.	Mold Initial Volume	V m	.0253		.0253
	Volume Change *	ΔV	0.005445		0.005504
	Volume of Soil	V s	0.019855		0.019796
Weight Lb.	Tare + Soil Dry	W			
	Tare	W m			
	Soil Dry	W s		1.95576	1.9914
Max. Dry Density pcf.		γ_d			
Max. Dry Density Average pcf.			98.50		100.60

$$* \Delta V = \frac{\Delta h \times A_m}{12}$$

Sample Description & Remarks _____

Labadie 36% Fly Ash 64% Pre-Pump Duck Creek Gypsum (Trail 2)

Trial #	1	2	3	4	5	6		
Minimum Density								
Tare + Material (g)	835.58	838.48	832.77	844.1	819.26	826.22		
Tare (g)	67.76	68.09	67.24	68.39	67.26	67.18		
Material (g)	767.82	770.39	765.53	775.71	752	759.04		
Diameter (in)	3.057	3.0595	3.0678	3.056	3.0588	3.0618		
Length (in)	5.9404	5.9383	5.9375	5.9466	5.9411	5.9436		
X-Section Area (in ²)	7.339741	7.351751	7.391694	7.33494	7.348387	7.362809		
Volume (in ³)	43.601	43.6569	43.88818	43.61796	43.6575	43.76159		
Density (g/in ³)	17.61015	17.64646	17.44274	17.78419	17.22499	17.34489		
Density (pcf)	67.0874	67.22576	66.44964	67.75043	65.62011	66.07689	Average= 66.7017	Stand. Dev.= 0.793349
Density After 8 Minutes of Vibration								
Change in Length	1.2545	1.2705	1.2145	1.3575	1.723	1.823		
Change in Length	1.461	1.516	1.3225	1.779	1.3845	1.498		
Change in Length	1.724	1.82	1.9	1.4168	1.385	1.3025		
Change in Length	1.419	1.584	1.6525	1.207	1.6145	1.438		
Average Change in Length	1.464625	1.547625	1.522375	1.440075	1.52675	1.515375		
Change in Volume	10.74997	11.37775	11.25293	10.56286	11.21915	11.15742		
New Volume	32.85103	32.27915	32.63525	33.05509	32.43835	32.60417		
Density (g/in ³)	23.37278	23.86649	23.45715	23.46719	23.18243	23.28046		
Density (pcf)	89.04067	90.92149	89.36207	89.40031	88.31552	88.68894	Average= 89.28817	Stand. Dev.= 0.900239

Figure B-23

RELATIVE DENSITY TEST

(Minimum & Maximum Density Determinations)

Job AM UE LCP studiesBoring No. LAB Fly Ash 367.Depth D.C. Pre Pump 647.

Sample No. _____

Mold Vol. .0252/.0253 (cu. ft.) (Vm)Mold End Area .05097/.05105 (sq. ft.) (Am)Lab Test by JSP Date 8/23/10

Computed by _____ Date _____

Checked by _____ Date _____

Mold No. _____

Mold Diam. _____ (in)

Mold Wt. _____ (lb.)

*new material**Redial
Trial #2*

$$\text{Relative Density} = \frac{\gamma_{\text{max.}} (\gamma_{\text{field}} - \gamma_{\text{min.}})}{\gamma_{\text{field}} (\gamma_{\text{max.}} - \gamma_{\text{min.}})} \times 100$$

Relative
Density

MINIMUM DENSITY

Trial No. _____

Weight

Tare + Soil Dry

W

835.58838.48

Tare

W

67.7668.09

Lb.

Soil Dry

W s

767.82770.39

Min. Dry Density pcf.

 γ_d

Min. Dry Density Average pcf

MAXIMUM DENSITY

Method Used _____

Trial No. _____

Height

Inches

Initial Dial Reading _____

h o

1.25451.2705

Left Dial Reading _____

h l

1.46101.5160

Right Dial Reading _____

h r

1.72401.8200

Sum _____

h l + h r

1.41901.5840

Average Dial Reading _____

h a

Height Change

 Δh

Volume

cu. ft.

Mold Initial Volume

V m

Volume Change *

 ΔV

Volume of Soil

V s

Weight

Lb.

Tare + Soil Dry

W

Tare

W m

Soil Dry

W s

Max. Dry Density pcf.

 γ_d

Max. Dry Density Average pcf.

$$* \Delta V = \frac{\Delta h \times A_m}{12}$$

Sample Description & Remarks _____

RELATIVE DENSITY TEST

(Minimum & Maximum Density Determinations)

Job _____

Boring No. LAB Fly Ash 367-Depth D.C. Pre Pump 64%

Sample No. _____

Mold Vol. .0254/.0253 (cu. ft.) (Vm)Mold End Area .05133/.0509 (sq. ft.) (Am)

Lab Test by _____ Date _____

Computed by _____ Date _____

Checked by _____ Date _____

Mold No. _____

Mold Diam. _____ (in)

Mold Wt. _____ (lb.)

$$\text{Relative Density} = \frac{\rho_{\text{max.}} (\rho_{\text{field}} - \rho_{\text{min.}})}{\rho_{\text{field}} (\rho_{\text{max.}} - \rho_{\text{min.}})} \times 100$$

MINIMUM DENSITY

Trial No. _____

Weight

Tare + Soil Dry

W

832.77844.10

Tare

W

67.2468.39

Lb.

Soil Dry

W s

765.53775.71

Min. Dry Density pcf.

 ρ_d

Min. Dry Density Average pcf.

MAXIMUM DENSITY

Method Used _____

Trial No. _____

Height
Inches

Initial Dial Reading

h o

1.21451.3575

Left Dial Reading

h l

1.32251.7790

Right Dial Reading

h r

1.90001.4168

Sum

h l + h r

1.65251.2070

Average Dial Reading

h a

Height Change

 Δh Volume
cu. ft.

Mold Initial Volume

V m

Volume Change *

 ΔV

Volume of Soil

V s

Weight
Lb.

Tare + Soil Dry

W

Tare

W m

Soil Dry

W s

Max. Dry Density pcf.

 ρ_d

Max. Dry Density Average pcf.

$$* \Delta V = \frac{\Delta h \times A_m}{12}$$

Sample Description & Remarks _____

RELATIVE DENSITY TEST

(Minimum & Maximum Density Determinations)

Job _____

Boring No. LPB Fly Ash 36%Depth D. C. Prepump 64%

Sample No. _____

Mold Vol. .0253 / .0253 (cu. ft.) (Vm)Mold End Area .0510 / .0511 (sq. ft.) (Am)

Lab Test by _____ Date _____

Computed by _____ Date _____

Checked by _____ Date _____

Mold No. _____

Mold Diam. _____ (in)

Mold Wt. _____ (lb.)

$$\text{Relative Density} = \frac{\gamma_{\text{max.}} (\gamma_{\text{field}} - \gamma_{\text{min.}})}{\gamma_{\text{field}} (\gamma_{\text{max.}} - \gamma_{\text{min.}})} \times 100$$

MINIMUM DENSITY

Trial No. _____

Weight

Tare + Soil Dry

W

819.26826.22

Tare

W

67.2667.18

Lb.

Soil Dry

W s 752.00759.04

Min. Dry Density pcf.

 γ_d

Min. Dry Density Average pcf

MAXIMUM DENSITY

Method Used _____

Trial No. _____

Height
Inches

Initial Dial Reading

h o

1.72301.8230

Left Dial Reading

h l

1.38451.4980

Right Dial Reading

h r

1.38501.3025

Sum

h l + h r

1.61451.4380

Average Dial Reading

h a

Height Change

 Δh Volume
cu. ft.

Mold Initial Volume

V m

Volume Change *

 ΔV

Volume of Soil

V s

Weight
Lb.

Tare + Soil Dry

W

Tare

W m

Soil Dry

W s

Max. Dry Density pcf.

 γ_d

Max. Dry Density Average pcf.

$$* \Delta V = \frac{\Delta h \times A_m}{12}$$

Sample Description & Remarks _____



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Project: Ameren UE – CCP Ash Study Date: 08/25/2010
R&J Personnel: James R. David / Jason J. Pruett R&J No.: 2008012455

Ameren UE – CCP Ash Study Set-up Time and Dry Unit Weight

Dry Sample Components: **Testing Date:** 8/20/2010

46% Labadie Fly Ash + 20% Labadie Bottom Ash
+ 34% Duck Creek “Pre-pumped” Gypsum

Dry Components: 500 grams **Water Added to Dry Components:** 137.5 grams
Percent Moisture (by weight): 27.5%

After thoroughly mixing at 0 min: wet, shiny, slurry, soft

5 min set time: dull appearance, becoming warm, imprintable with finger, water on surface during imprint, “silt like”, starting to cement

10 min set time: dull, hard, very slightly imprintable, slightly warm

Dry Unit Weight: 95 pcf

Dry Components: 500 grams **Water Added to Dry Components:** 112.5 grams
Percent Moisture (by weight): 22.5%

After thoroughly mixing at 0 min: wet, shiny appearance, slurry to pudding texture

5 min set time: dull, hard, very slightly imprintable, slightly warm

10 min set time: not imprintable, dull, hard, slightly warm

Dry Unit Weight: 100 pcf

Ameren UE – CCP Ash Study Set-up Time and Dry Unit Weight

Dry Sample Components:

46% Labadie Fly Ash + 20% Labadie Bottom Ash
+ 34% Duck Creek "Pre-pumped" Gypsum

Testing Date: 8/20/2010

Dry Components: 500 grams

Water Added to Dry Components: 87.5 grams

Percent Moisture (by weight): 17.5%

After thoroughly mixing at 0 min: wetted powder, dull, wet clumps or balls, soft "bread like" texture, imprintable, trace dry material

5 min set time: slightly imprintable, slightly warm, cementing

10 min set time: not imprintable, hard, slightly warm, cemented

Dry Unit Weight: 79 pcf



Figure B-24
SCHEDULE CJG-ST1

Reitz & Jens, Inc.

RELATIVE DENSITY TEST

(Minimum & Maximum Density Determinations)

Job Ameren UE - CCP Ash Study
 Boring No. Labadie Blenc
 Depth 40% Fly + 20% Blm + 34% A.C. "dry" JIP
 Sample No. _____
 Mold Vol. .0253 (cu. ft.) (Vm)
 Mold End Area .05106 (sq. ft.) (Am)

Lab Test by JP Date 8/23/10
 Computed by _____ Date _____
 Checked by _____ Date _____
 Mold No. _____
 Mold Diam. _____ (in)
 Mold Wt. _____ (lb.)

$$\text{Relative Density} = \frac{\gamma_{\text{max}} (\gamma_{\text{field}} - \gamma_{\text{min}})}{\gamma_{\text{field}} (\gamma_{\text{max}} - \gamma_{\text{min}})} \times 100$$

MINIMUM DENSITY							
Trial No.			<u>27 1/2</u>		<u>27 1/2</u>		
Weight	Tare + Soil Dry	W					
	Tare	W					
Lb.	Soil Dry	W s	<u>500.0g</u>	<u>1.10231 #</u>	<u>500.0g</u>	<u>1.10231 #</u>	
Min. Dry Density pcf.			<u>8 d</u>				
Min. Dry Density Average pcf.							
MAXIMUM DENSITY							
Method Used							
Trial No.							
Height Inches	Initial Dial Reading	h o	<u>3.2265</u>		<u>3.5065</u>		
	Left Dial Reading	h l	<u>3.2270</u>		<u>3.2435</u>		
	Right Dial Reading	h r	<u>3.2165</u>		<u>3.1935</u>		
	Sum	h l + h r	<u>3.2130</u>		<u>3.5010</u>		
	Average Dial Reading	h a		<u>3.2208</u>		<u>3.3611</u>	
	Height Change	Δ h					
Volume cu. ft.	Mold Initial Volume	V m		<u>.0253</u>		<u>.0253</u>	
	Volume Change *	Δ V		<u>.01370</u>		<u>.01430</u>	
	Volume of Soil	V s		<u>.01160</u>		<u>.0110</u>	
Weight Lb.	Tare + Soil Dry	W					
	Tare	W m					
	Soil Dry	W s					
Max. Dry Density pcf.			<u>8 d</u>				
Max. Dry Density Average pcf.				<u>95.03</u>		<u>100.21</u>	

$$* \Delta V = \frac{\Delta h \times A_m}{12}$$

Sample Description & Remarks _____

Reitz & Jens, Inc.

RELATIVE DENSITY TEST

(Minimum & Maximum Density Determinations)

Job _____

Lab Test by _____ Date _____

Boring No. _____

Computed by _____ Date _____

Depth _____

Checked by _____ Date _____

Sample No. _____

Mold No. _____

Mold Vol. _____ (cu. ft.) (Vm)

Mold Diam. _____ (in)

Mold End Area _____ (sq. ft.) (Am)

Mold Wt. _____ (lb.)

$$\text{Relative Density} = \frac{\gamma_{\text{max}} (\gamma_{\text{field}} - \gamma_{\text{min}})}{\gamma_{\text{field}} (\gamma_{\text{max}} - \gamma_{\text{min}})} \times 100$$

MINIMUM DENSITY

Trial No.				17 1/2%	
Weight	Tare + Soil Dry	W			
	Tare	W			
Lb.	Soil Dry	W s	500.0	1.0231 *	
Min. Dry Density pcf.		γ_d			
Min. Dry Density Average pcf					

MAXIMUM DENSITY

Method Used					
Trial No.					
Height	Initial Dial Reading	h o	2.6010		
Inches	Left Dial Reading	h l	2.6770		
	Right Dial Reading	h r	2.7265		
	Sum	h l + h r	2.6530		
	Average Dial Reading	h a		2.6644	
	Height Change	Δh			
Volume	Mold Initial Volume	V m		10253	
cu. ft.	Volume Change *	ΔV		.01134	
	Volume of Soil	V s		.01396	
Weight	Tare + Soil Dry	W			
Lb.	Tare	W m			
	Soil Dry	W s			
Max. Dry Density pcf.		γ_d			
Max. Dry Density Average pcf.				78.96	

$$* \Delta V = \frac{\Delta h \times A_m}{12}$$

Sample Description & Remarks _____

Set-up / Unit wt.

JR/JJP
8/20/10

Ameren UE - CCP Fly Ash Study
Labadie Blend

500g soil

46% Fly 2/2/09 collect

20% Btm 2/2/09 "

34% D.C. "Dry" Gypsum 6/10-7/10 collect

27 1/2% $\Rightarrow$ 9:33 = 0 min $\Rightarrow$ Wet, Shiny, Slurry, Soft,
137.5
9:36 = 5 min $\Rightarrow$ dull appearance, becoming warm
imprintable w/ finger, water surface
during imprint, (Silt like), cementing
9:43 = 10 min $\Rightarrow$ hard, very slightly imprintable
dull, slightly warm

22 1/2% $\Rightarrow$ 9:46 = 0 min $\Rightarrow$ Wet, Shiny surface, pudding
112.5 texture
9:51 5 min $\Rightarrow$ dull, hard, very slight imprint,
Slightly warm
9:56 10 min $\Rightarrow$ Same, non-imprintable

17 1/2% $\Rightarrow$ 10:12 0 min $\Rightarrow$ Wetted powder, dull, wet clumps
87.5 or balls, ~~soft bread~~ soft bread
like texture, imprintable, trace
dry particles
10:17 5 min $\Rightarrow$ Slightly imprintable, rest same
Slightly warm

10:22 10 min $\Rightarrow$ non-imprintable, rest same



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Project: Ameren UE – CCP Ash Study Date: 08/25/2010
R&J Personnel: James R. David / Jason J. Pruett R&J No.: 2008012455

Ameren UE – CCP Ash Study Set-up Time and Dry Unit Weight

Dry Sample Components:

Testing Date: 8/19/2010

30% Labadie Fly Ash + 25% Labadie Bottom Ash
+ 45% Duck Creek “Pre-pumped” Gypsum

Dry Components: 500 grams

Water Added to Dry Components: 137.5 grams

Percent Moisture (by weight): 27.5%

After thoroughly mixing at 0 min: wet, shiny, slurry, soft

5 min set time: dull, tacky surface, imprintable, moisture to surface during imprint, “silt like”

10 min set time: dull, cemented, not imprintable,

Dry Unit Weight: 95 pcf

Dry Components: 500 grams

Water Added to Dry Components: 112.5 grams

Percent Moisture (by weight): 22.5%

After thoroughly mixing at 0 min: wet, satin appearance, paste

5 min set time: slightly warm, slightly imprintable, dull, stiff to firm

10 min set time: dull, hard, not imprintable, cemented, slightly warm

Dry Unit Weight: 94 pcf

Ameren UE – CCP Ash Study Set-up Time and Dry Unit Weight

Dry Sample Components:

30% Labadie Fly Ash + 25% Labadie Bottom Ash
+ 45% Duck Creek "Pre-pumped" Gypsum

Testing Date: 8/19/2010

Dry Components: 500 grams

Water Added to Dry Components: 87.5 grams

Percent Moisture (by weight): 17.5%

After thoroughly mixing at 0 min: wet powder, small clumps, dull, imprintable, slightly warm,
lightly tamped flat

5 min set time: firm, slightly imprintable, slightly warm, dull in appearance

10 min set time: not imprintable, dull, cemented, slightly warm

Dry Unit Weight: 93 pcf



Figure B-25
SCHEDULE CJG-ST1

Reitz & Jens, Inc.

RELATIVE DENSITY TEST (Minimum & Maximum Density Determinations)

Job Ameren UE - CCP Ash Study
 Boring No. Labadie Blvd
 Depth 306 Fly + 25% Btm
+ 45% D.C. "dry" Cyp.
 Sample No. _____
 Mold Vol. .0253 (cu. ft.) (Vm)
 Mold End Area .05106 (sq. ft.) (Am)

Lab Test by RJ Date 8/25/10
 Computed by _____ Date _____
 Checked by _____ Date _____
 Mold No. _____
 Mold Diam. _____ (in)
 Mold Wt. _____ (lb.)

$$\text{Relative Density} = \frac{\gamma_{\text{max}} (\gamma_{\text{field}} - \gamma_{\text{min}})}{\gamma_{\text{field}} (\gamma_{\text{max}} - \gamma_{\text{min}})} \times 100$$

MINIMUM DENSITY							
Trial No.			27 1/2 %		22 1/2 %		
Weight	Tare + Soil Dry	W					
	Tare	W					
Lb.	Soil Dry	W s	500.0g	1.10231 #	500.0g	1.10231	
Min. Dry Density pcf.		γ_d					
Min. Dry Density Average pcf							
MAXIMUM DENSITY							
Method Used							
Trial No.							
Height Inches	Initial Dial Reading	h o	3.2495		3.1545		
	Left Dial Reading	h l	3.2130		3.1405		
	Right Dial Reading	h r	3.1620		3.1460		
	Sum	h l + h r	3.2165		3.2775		
	Average Dial Reading	h a		3.21025		3.1796	
	Height Change	Δh					
Volume cu. ft.	Mold Initial Volume	V m		.0253		.0253	
	Volume Change *	ΔV		.01366		.01353	
	Volume of Soil	V s		.01164		.01177	
Weight Lb.	Tare + Soil Dry	W					
	Tare	W m					
	Soil Dry	W s					
Max. Dry Density pcf.		γ_d					
Max. Dry Density Average pcf.			94.70		93.65		

$$* \Delta V = \frac{\Delta h \times A m}{12}$$

Sample Description & Remarks _____

Reitz & Jens, Inc.

RELATIVE DENSITY TEST

(Minimum & Maximum Density Determinations)

Job _____

Lab Test by _____ Date _____

Boring No. _____

Computed by _____ Date _____

Depth _____

Checked by _____ Date _____

Sample No. _____

Mold No. _____

Mold Vol. _____ (cu. ft.) (Vm)

Mold Diam. _____ (in)

Mold End Area _____ (sq. ft.) (Am)

Mold Wt. _____ (lb.)

$$\text{Relative Density} = \frac{\gamma_{\text{max.}} (\gamma_{\text{field}} - \gamma_{\text{min.}})}{\gamma_{\text{field}} (\gamma_{\text{max.}} - \gamma_{\text{min.}})} \times 100$$

MINIMUM DENSITY

Trial No.		171296	
Weight	Tare + Soil Dry	W	
	Tare	W	5
Lb.	Soil Dry	W s	500.0g 1.10231
Min. Dry Density pcf.		γ_d	
Min. Dry Density Average pcf			

MAXIMUM DENSITY

Method Used			
Trial No.			
Height Inches	Initial Dial Reading	h o	3.0850
	Left Dial Reading	h l	3.1735
	Right Dial Reading	h r	3.1980
	Sum	h l + h r	3.1370
	Average Dial Reading	h a	3.14838
	Height Change	Δh	
Volume cu. ft.	Mold Initial Volume	V m	.0253
	Volume Change *	ΔV	.013376
	Volume of Soil	V s	.01190
Weight Lb.	Tare + Soil Dry	W	
	Tare	W m	
	Soil Dry	W s	
Max. Dry Density pcf.		γ_d	
Max. Dry Density Average pcf.			92.63

$$* \Delta V = \frac{\Delta h \times A_m}{12}$$

Sample Description & Remarks _____

Set-Time / Unit wt

JRC + JTP
8/19/10

Ameren UE - CCP Ash Study

500g

Labadie Blend

30% Fly 2/2/09 collect

25% Blm " "

45% D.C. "Dry" Cyp. 6/10-7/10 collect

27 1/2% $\Rightarrow$ 3:35 0 min = wet, shiny, Slurry,
137.5g H₂O 3:40 5 min = dull, tacky surface, imprintable
moisture to surface during imprint
3:45 10 min = cemented, non-imprint, dull

22 1/2% $\Rightarrow$ 3:50 0 min = wet, Satin appearance,
112.5g H₂O paste,
3:55 5 min = slightly warm, slight imprint,
dull, firm to stiff
4:00 10 min = non-imprint, dull, ~~hard~~ hard
cemented, slightly warm

17 1/2% $\Rightarrow$ 4:05 0 min = wet powder, small clumps, dull
87.5g H₂O imprintable, slightly warm

4:10 5 min = same, firm, slightly imprint

4:15 10 min = non-imprint, dull, cemented,
slightly warm



Project: Ameren UE – CCP Ash Study Date: 08/25/2010
R&J Personnel: James R. David / Jason J. Pruett R&J No.: 2008012455

Ameren UE – CCP Ash Study Set-up Time and Dry Unit Weight

Dry Sample Components:

Testing Date: 8/19/2010

- 36% Labadie Fly Ash
- + 64% Duck Creek “Pre-pumped” Gypsum

Dry Components: 500 grams

Water Added to Dry Components: 200 grams

Percent Moisture (by weight): 40%

After thoroughly mixing at 0 min: wet, shiny, liquid to thin slurry, warm

5 min set time: dull appearance, warm, very slightly imprintable

10 min set time: same as above

18 min set time: no longer imprintable, hard, warm

Dry Unit Weight: 82 pcf

Dry Components: 500 grams

Water Added to Dry Components: 175 grams

Percent Moisture (by weight): 35%

After thoroughly mixing at 0 min: wet, shiny appearance, slurry, warm

5 min set time: dull, very slightly imprintable, warm

10 min set time: dull, not imprintable, hard, cemented, warm

Dry Unit Weight: 89 pcf

Ameren UE – CCP Ash Study Set-up Time and Dry Unit Weight

Dry Sample Components:

36% Labadie Fly Ash
+ 64% Duck Creek "Pre-pumped" Gypsum

Testing Date: 8/19/2010

Dry Components: 500 grams

Water Added to Dry Components: 150 grams

Percent Moisture (by weight): 30%

After thoroughly mixing at 0 min: moist powder, large clumps, warm, easily imprinted, trace dry material

5 min set time: slightly imprintable, dull, warm, clumpy appearance

10 min set time: not imprintable, dull, warm, hard

Dry Unit Weight: 72 pcf



Figure B-26

SCHEDULE CJG-ST1

RELATIVE DENSITY TEST

(Minimum & Maximum Density Determinations)

Job Ameren UE - CCP Ash Study
 Boring No. Labadie Blend
 Depth 30% Fly + 64% O.C. "Dry" Gyp
 Sample No. _____
 Mold Vol. .0253 (cu. ft.) (Vm)
 Mold End Area .05106 (sq. ft.) (Am)

Lab Test by GR Date 8/25/10
 Computed by _____ Date _____
 Checked by _____ Date _____
 Mold No. _____
 Mold Diam. _____ (in)
 Mold Wt. _____ (lb.)

$$\text{Relative Density} = \frac{\rho_{\text{max}} (\rho_{\text{field}} - \rho_{\text{min}})}{\rho_{\text{field}} (\rho_{\text{max}} - \rho_{\text{min}})} \times 100$$

MINIMUM DENSITY					
Trial No.		40%		35%	
Weight	Tare + Soil Dry	W			
	Tare	W			
Lb.	Soil Dry	W s	500.0g	1.10231#	500.0g 1.10231#
Min. Dry Density pcf.		ρ_d			
Min. Dry Density Average pcf.					
MAXIMUM DENSITY					
Method Used					
Trial No.					
Height Inches	Initial Dial Reading	h o	2.7410	3.0420	
	Left Dial Reading	h l	2.7410	3.0010	
	Right Dial Reading	h r	2.8010	3.0085	
	Sum	h l + h r	2.8290	3.0000	
	Average Dial Reading	h a	2.7780	3.0279	
	Height Change	Δh			
Volume cu. ft.	Mold Initial Volume	V m	.0253	.0253	
	Volume Change *	ΔV	.01182	.01288	
	Volume of Soil	V s	.01348	.01242	
Weight Lb.	Tare + Soil Dry	W			
	Tare	W m			
	Soil Dry	W s			
Max. Dry Density pcf.		ρ_d			
Max. Dry Density Average pcf.			81.77	88.75	

$$* \Delta V = \frac{\Delta h \times A_m}{12}$$

Sample Description & Remarks _____

Reitz & Jens, Inc.

RELATIVE DENSITY TEST (Minimum & Maximum Density Determinations)

Job _____

Lab Test by _____ Date _____

Boring No. _____

Computed by _____ Date _____

Depth _____

Checked by _____ Date _____

Sample No. _____

Mold No. _____

Mold Vol. _____ (cu. ft.) (Vm)

Mold Diam. _____ (in)

Mold End Area _____ (sq. ft.) (Am)

Mold Wt. _____ (lb.)

$$\text{Relative Density} = \frac{\gamma_{\text{max.}} (\gamma_{\text{field}} - \gamma_{\text{min.}})}{\gamma_{\text{field}} (\gamma_{\text{max.}} - \gamma_{\text{min.}})} \times 100$$

MINIMUM DENSITY

Trial No.					
Weight	Tare + Soil Dry	W			
	Tare	W			
Lb.	Soil Dry	W s	500.0g	1.10231 #	
Min. Dry Density pcf.		γ_d			
Min. Dry Density Average pcf					

MAXIMUM DENSITY

Method Used					
Trial No.					
Height Inches	Initial Dial Reading	h o	2.2980		
	Left Dial Reading	h l	2.3470		
	Right Dial Reading	h r	2.5120		
	Sum	h l + h r	2.3530		
	Average Dial Reading	h a	2.3075		
	Height Change	Δh			
Volume cu. ft.	Mold Initial Volume	V m	.0253		
	Volume Change *	ΔV	.01007		
	Volume of Soil	V s	.01523		
Weight Lb.	Tare + Soil Dry	W			
	Tare	W m			
	Soil Dry	W s			
Max. Dry Density pcf.		γ_d			
Max. Dry Density Average pcf.			72.38		

$$* \Delta V = \frac{\Delta h \times A_m}{12}$$

Sample Description & Remarks _____

Set time / unit wt.

Labadie Plant

36% Fly collect 2/2/10

+ 64% D.C. "dry" gypsum collect 6/10-7/10

Re / JTP
8/19/10

500g sample

2:52 40% M $\Rightarrow$ D_{min} = wet, shiny, liquid, warm
200g H₂O
2:57 S_{min} = dull, warm, very slightly imprintable

3:02 10 min = Same

3:10 no longer imprintable, warm

3:08 35% M $\Rightarrow$ D = wet, shiny, slurry, warm
175g H₂O

3:13 S_{min} = dull, v. slight imprint, warm

3:18 10 min = dull, cemented, non-imprint, warm

3:20 30% $\Rightarrow D$ = Mixture has large clumps, warm, easily
150g H₂O imprinted by hand, not evenly mixed,
dry pockets (speed too high for a while)

3:25 S_{min} = slightly imprintable, dull, warm,
clumpy appearance

3:30 10 min = no longer imprintable, same

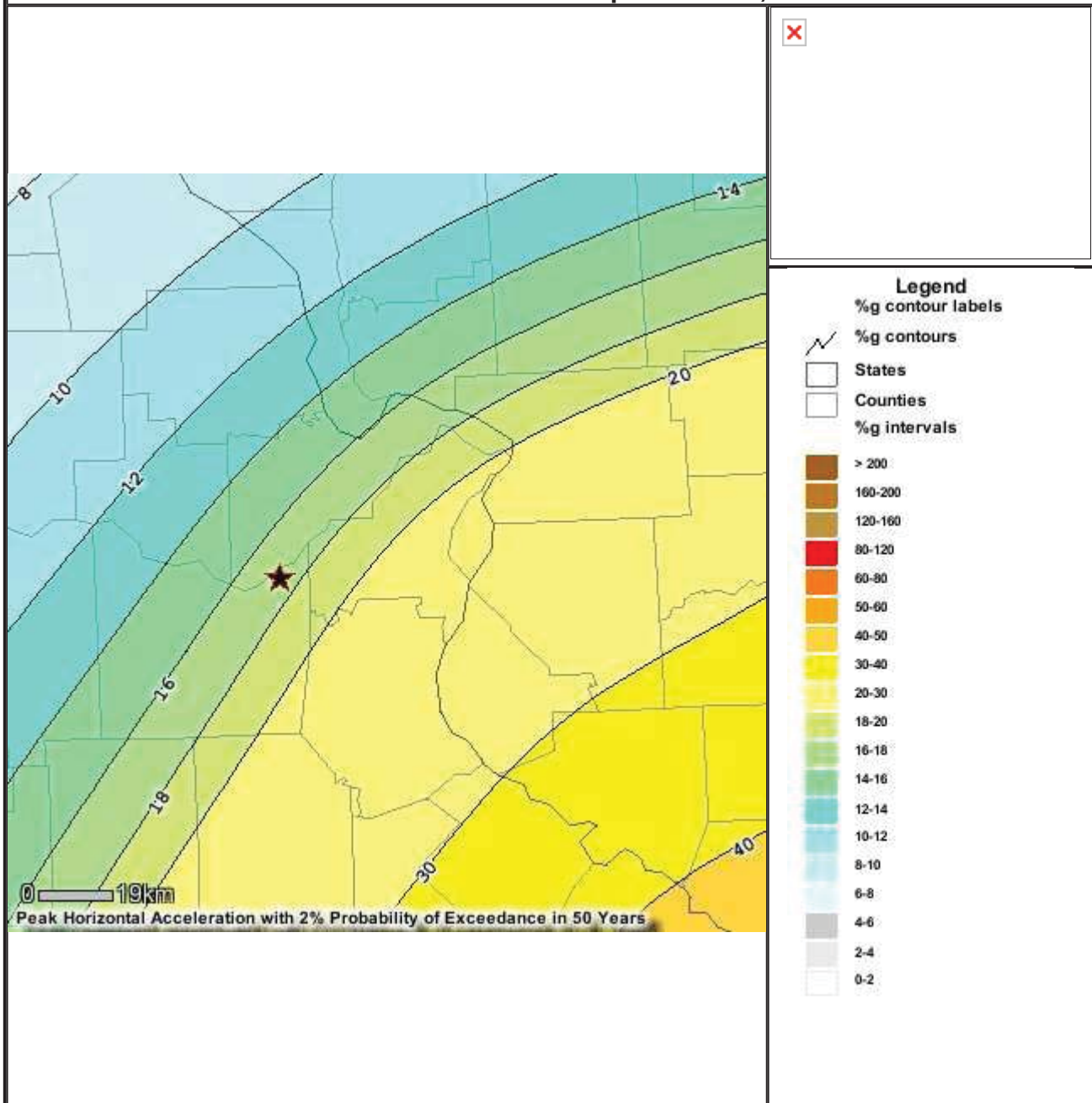
Appendix C

RESULTS OF SEISMIC RISK ANALYSES
Revised November 2013

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USGS Seismic Hazard Maps: Labadie, MO



<http://gldims.cr.usgs.gov/servlet/com.esri.esrimap.Esrimap?ServiceName=redirect&Form=Tr...> 4/15/2011

PSH Deaggregation on NEHRP A rock

Saint_Louis 90.181° W, 38.622 N.

Peak Horiz. Ground Accel. ≥ 0.1532 g

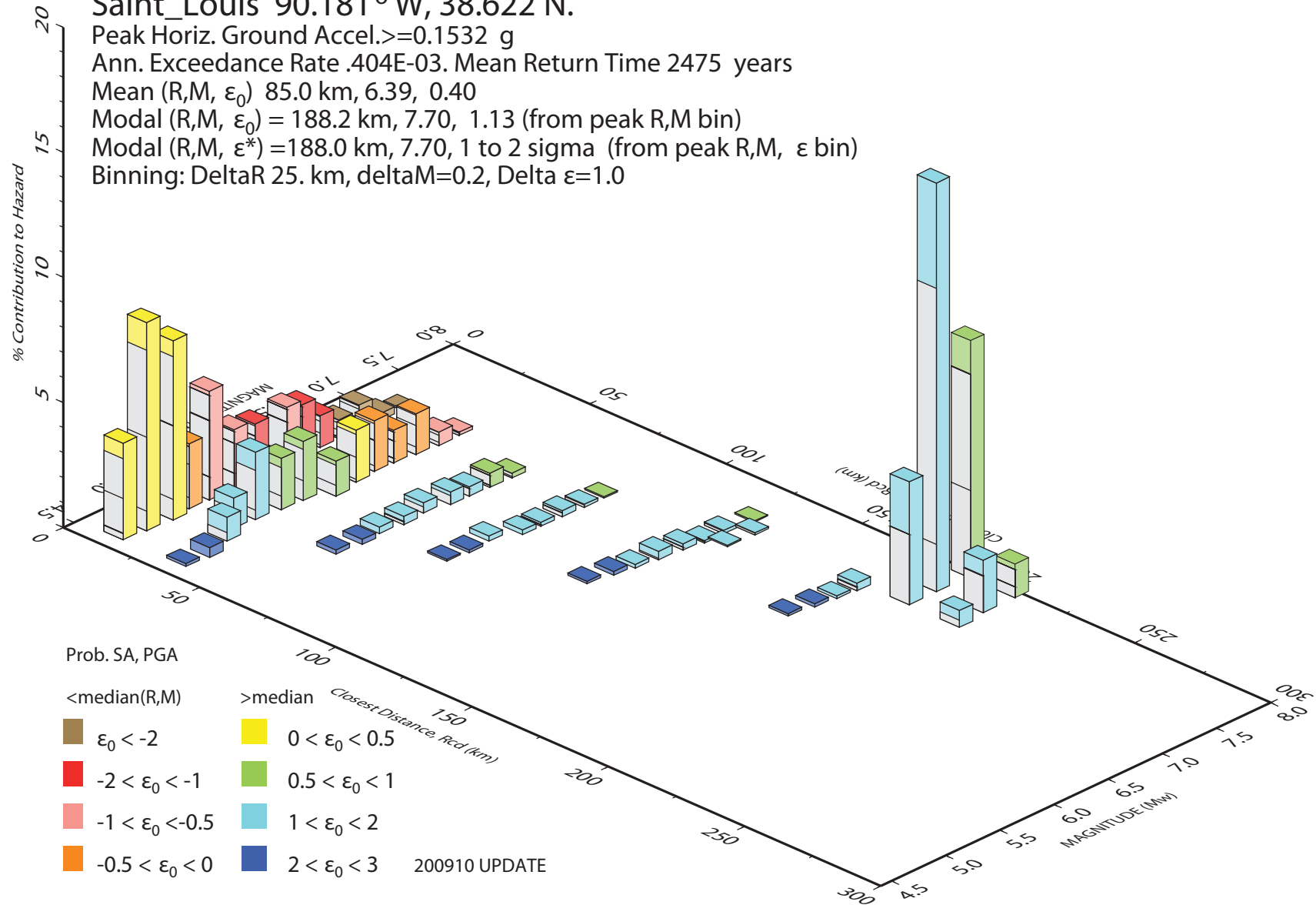
Ann. Exceedance Rate .404E-03. Mean Return Time 2475 years

Mean (R,M, ϵ_0) 85.0 km, 6.39, 0.40

Modal (R,M, ϵ_0) = 188.2 km, 7.70, 1.13 (from peak R,M bin)

Modal (R,M, ϵ^*) = 188.0 km, 7.70, 1 to 2 sigma (from peak R,M, ϵ bin)

Binning: DeltaR 25. km, deltaM=0.2, Delta ϵ =1.0



GMT 2011 Apr 26 17:21:12

Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on rock with average vs=2000. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted

PSH Deaggregation on NEHRP A rock

Labadie, MO 90.821° W, 38.558 N.

Peak Horiz. Ground Accel. ≥ 0.11108 g

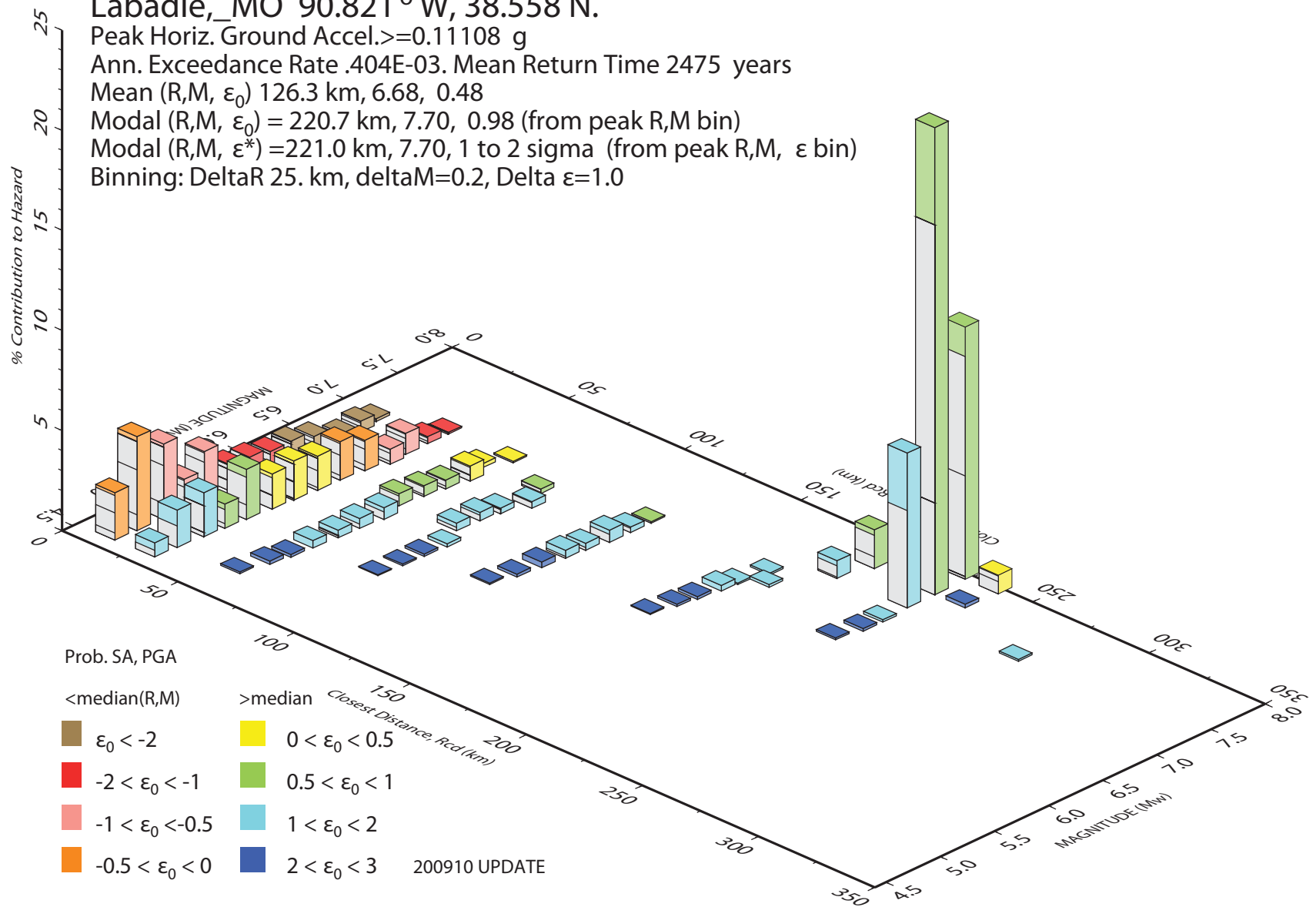
Ann. Exceedance Rate .404E-03. Mean Return Time 2475 years

Mean (R,M, ϵ_0) 126.3 km, 6.68, 0.48

Modal (R,M, ϵ_0) = 220.7 km, 7.70, 0.98 (from peak R,M bin)

Modal (R,M, ϵ^*) = 221.0 km, 7.70, 1 to 2 sigma (from peak R,M, ϵ bin)

Binning: DeltaR 25. km, deltaM=0.2, Delta ϵ =1.0



GMT 2011 Apr 26 19:04:54

Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on rock with average vs=2000. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted

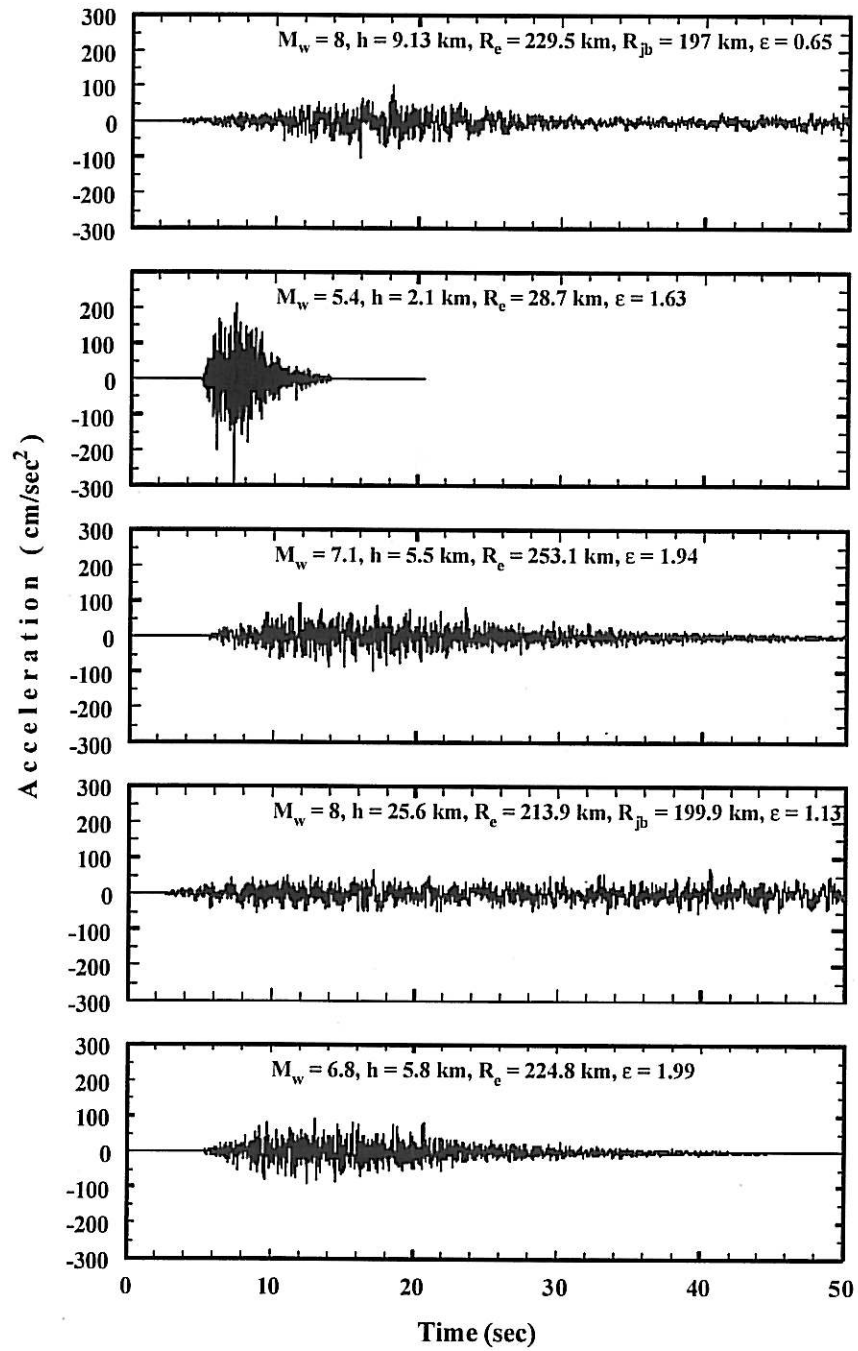


Figure 30. Suite of 2% in 50 years Ground Motions for Bedrock (Hard Rock), St. Louis, MO.

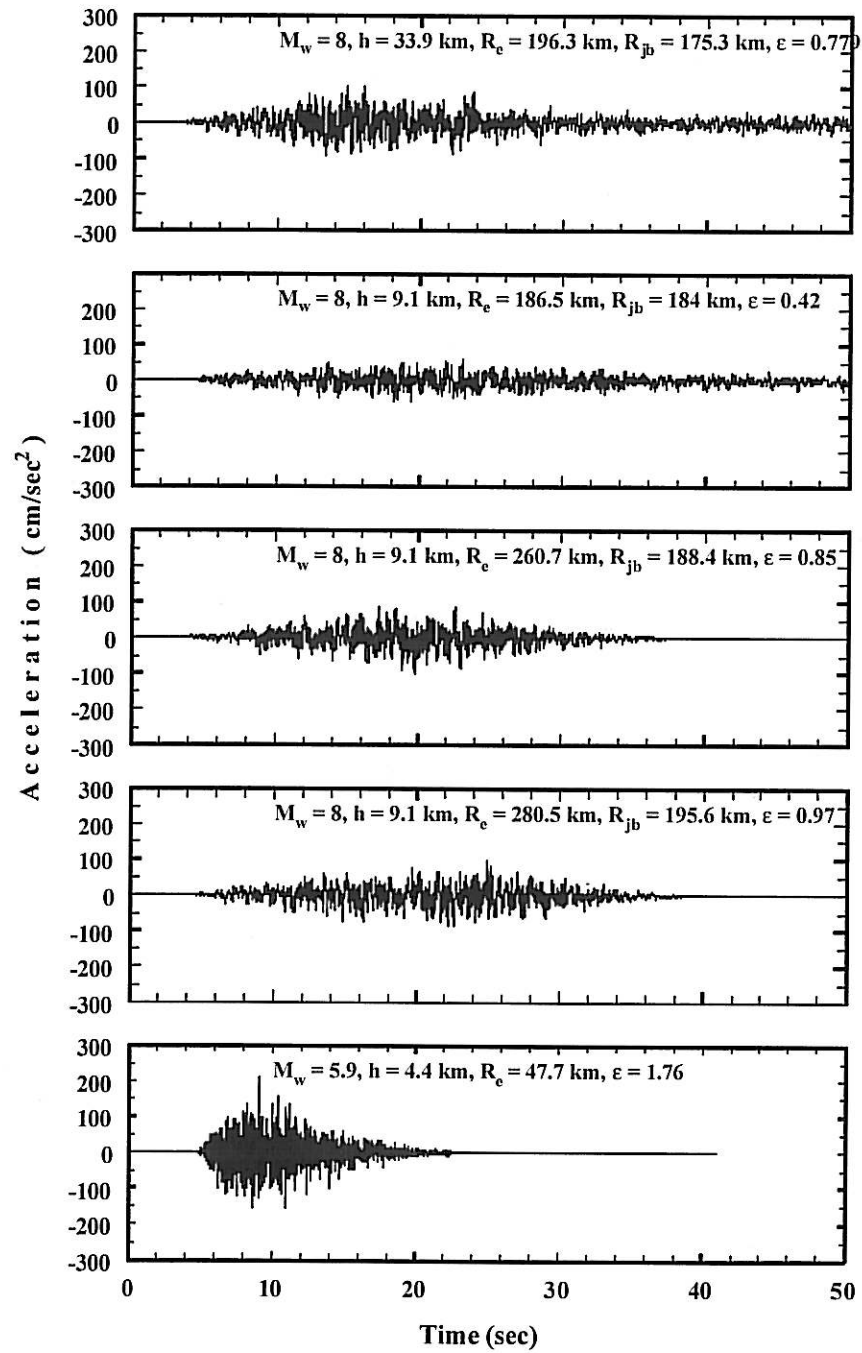


Figure 30 (continued).

Option 1 - Set No. 1 - Material No.: 1

G/Gmax - C3 (CLAY PI =20-40, Sun et al. 198)

Damping - Soil with PI=30, OCR=1-8 (Vucetic & Dobry, JGE 1/91)

Point No.	Shear Strain (%)	G/Gmax	Point No.	Shear Strain (%)	Damping Ratio (%)
1	.0001	1	1	.002	1.7
2	.001	.999	2	.003	2.1
3	.00316	.98	3	.004	2.5
4	.01	.92	4	.005	2.6
5	.0316	.78	5	.006	2.9
6	.1	.532	6	.008	3.3
7	.316	.293	7	.01	3.7
8	1	.137	8	.02	5.05
9	3.16	.075	9	.03	5.7
10	10	.025	10	.04	6.4
			11	.05	6.9
			12	.06	7.3
			13	.08	8.1
			14	.1	8.7
			15	.2	10.8
			16	.3	12.3
			17	.4	13.3
			18	.5	14.1
			19	.7	15.6
			20	1	16.9

Option 1 - Set No. 1 - Material No.: 2

G/Gmax - SAND, Average (Seed & Idriss 1970)

Damping for SAND, February 1971

Point No.	Shear Strain (%)	G/Gmax	Point No.	Shear Strain (%)	Damping Ratio (%)
1	.0001	1	1	.0001	1
2	.0003	.98	2	.001	1.6
3	.001	.95	3	.003	3.12
4	.003	.89	4	.01	5.8
5	.01	.73	5	.03	9.5
6	.03	.52	6	.1	15.4
7	.1	.29	7	.3	20.9
8	.3	.14	8	1	25
9	1	.06	9	10	30

Option 1 - Set No. 1 - Material No.: 3

G/Gmax - ROCK (Schnabel 1973)

Damping for ROCK (Schnabel 1973)

Point No.	Shear Strain (%)	G/Gmax	Point No.	Shear Strain (%)	Damping Ratio (%)
1	.0001	1	1	.0001	.4
2	.0003	1	2	.001	.8
3	.001	.99	3	.01	1.5
4	.003	.95	4	.1	3
5	.01	.9	5	1	4.6
6	.03	.81			
7	.1	.725			
8	1	.55			

Option 2 - Set No. 1

Option 2 - Soil Profile B/C-100

Soil Deposit No.: 1 - Soil Profile No. 2